

Kinderanästhesie u – Schmerztherapie in der 3 – Welt



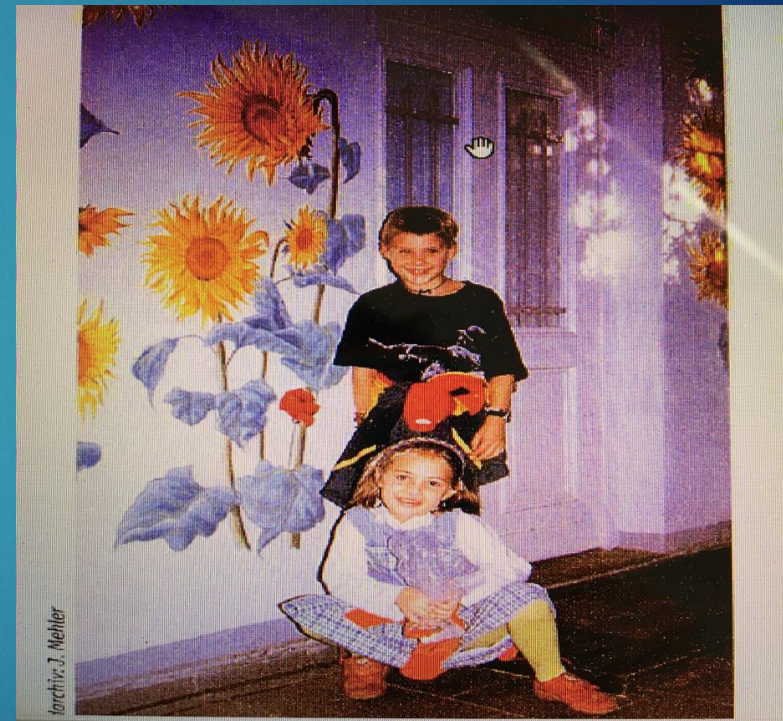
Good news

DIE TOP-STORIES DES TAGES

10/17



Meine anästhesiologische Vita



Kinder

- ▶ in vielen Ländern $> 1/2$ der Population

Hadley GP. Paediatric surgery in the third world. S Afr Med J 2006; 96:1139 f

- ▶ nicht selten Opfer von Gewalt, Trauma etc.

Hadley GP. Paediatric surgery in the third world. S Afr Med J 2006; 96:1139 f

- ▶ etwa 85 % benötigen Chirurgie vor dem 15 LJ

Bickler SW, Rode H. Surgical services for children in developing countries. Bull World Health Organ 2002; 80:829–835



Pediatric Surgery and Anesthesia in Low-Middle Income Countries: Current Situation and Ethical Challenges REVIEW
Review article : R. Pulvirenti et al
Front. Pediatr., 28 July 2022; Pediatr. Surgery

Realität

Afrika: 2,3 healthcare profess. / 1000 Einw.
Europa: 18,9
USA: 24,8

868 anesthetic nurses & 122 doctores in
13 frenchspeaking countries (97, 5 Mill. Einw.)

Anesthesia for children in Sub-Saharan Africa – a description of settings, common presenting conditions, techniques and outcomes
ABOUDOUL-FATAOU OURO-BANG'NA MAMAN, RAWÉLÉGUINBASBA ARMEL
FLAVIEN KABORE, Ped.Anesthesia 2009; 19, 5-11

Anesthesiologists Without Borders: Working for Better Surgical Outcomes in Resource Limited Settings

The surgical workforce in low and middle income countries is in crisis.

Doctors Without Borders has delivered emergency medical aid for 45 years.

1 anesthesiologist per 10,569 Americans¹

1 anesthesiologist per 5,733,062 Ethiopians¹

Médecins Sans Frontières – Operational Centre Brussels provided **75,536 anesthetics** over 6 years in **21 countries**²

7 residency programs have established **global anesthesia fellowships**³

The **American Society of Anesthesiologists** funds **8 residents/year** to work in Ethiopia⁴

- Boston Children's Hospital
- Dalhousie University
- Duke University
- Stanford University
- Vanderbilt University
- University of Washington
- Weill Cornell Medical College

Our anesthesia community has taken significant steps to help address this crisis, but there is much more work to be done.

Realität

Nur **13 %** der ugandischen Anästhesisten sichere Basisanästhesie bei Kindern unter 5 Jahren

Paediatric facemask & laryngoskope, Suction app. Paed. tracheal tubes

Pulse oximeter, Paediatric oropharyngeal airways, basic anesthetic

Tilting table, Paediatric breathing circuit, Paediatric intravenous cannulae

Hodges SC, Mijumbi C, Okello M, et al. Anaesthesia services in developing countries: defining the problems. *Anaesthesia* 2007; 62:4–11

Walker IA, Wilson IH. Anaesthesia in developing countries – a risk for patient
Lancet 2008; 371: 968–969

Table 7 Availability of anaesthetic drugs. Values are number

n = 91

available

available

Electricity
Generator

18 (19%)
45 (49%)

60 (65%)
34 (37%)

Table 9 Maintenance of equipment. Values are number (cent) of anaesthetists.

Yes

No

Can oxygen concentrators
be repaired locally?
Can suction machines be
repaired locally?
Are trained staff available
to repair equipment?

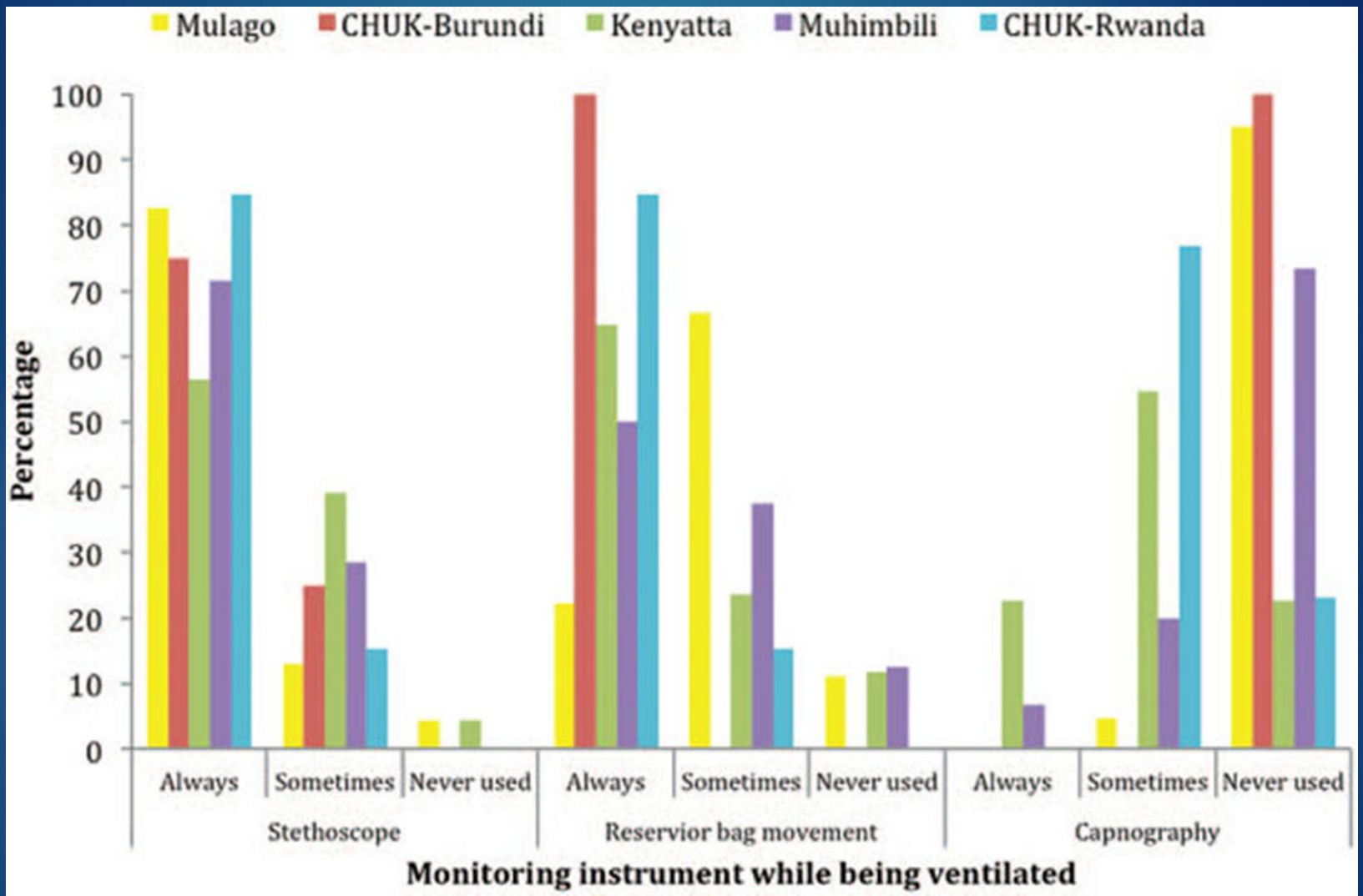
21 (23%)
35 (38%)
33 (36%)

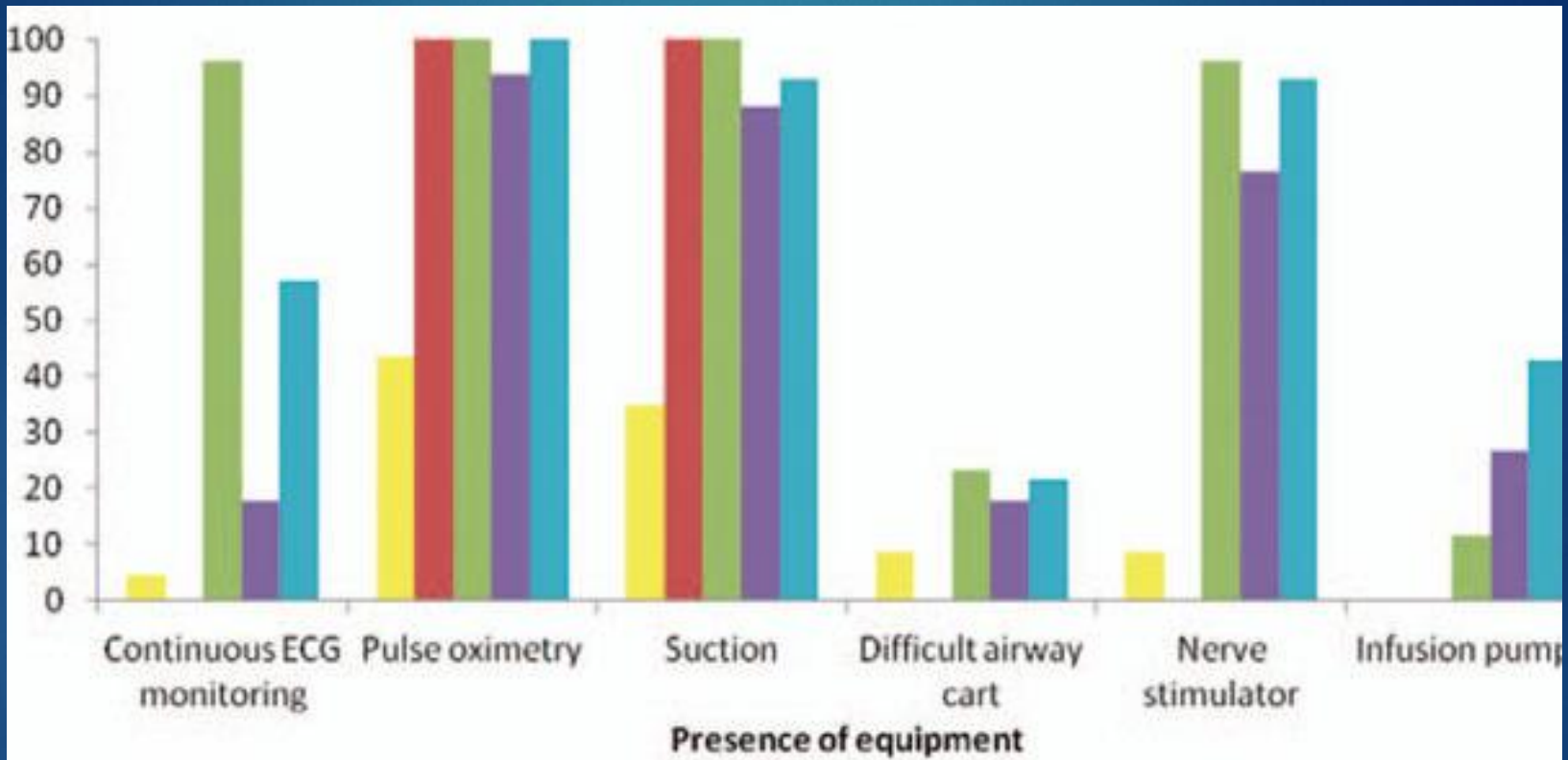
70 (77%)
56 (62%)
58 (64%)

Challenges of Anesthesia in Low- and Middle-Income Countries:

Anesth Analg. 2017; 124 (1), 290 -299

Isabella Epiu, MBChB*, Jossy Verel Bahe Tindimwebwa, MB ChB*, Cephas Mijumbi, MB ChB†, Thomas M. Chokwe, MBChB‡, Edwin Lugazia, MBChB, Francois Ndarugirire, PhD||, Theogene Twagirimugabe, MBChB, and Gerald Dubowitz, MB ChB





Availability of equipment during surgery at the National Referral Hospital in East Africa

Anästhesiemortalität in Entwicklungsländern

1 : 150 (133-482)

Ouro-Bang'na Maman AF, Tomta K, Ahouangbevi S et al.
Deaths associated with anaesthesia in Togo, West Africa. Trop
Doct 2005; 35: 220–222

0,9 : 100 000

Gottschalk A, Van Aken H, Zenz M, Standl T:
Is anesthesia dangerous? Dtsch Arztebl Int 2011; 108(27) 469 f



Unglückstrias i.d. Anästhesie

- ▶ Unbekannter Patient
- ▶ Unerfahrener Anästhesist
(unbekannter u. schlecht ausgestatteter Arbeitsplatz u Monitoring)
- ▶ Drängender Chirurg

Risk assessment for respiratory complications in paediatric anaesthesia: a prospective cohort study

B.S.v Ungern-Sternberg et al: The Lancet (2010) 376, 773f

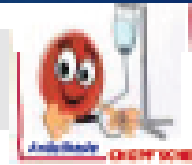
Anesthesia-related Cardiac Arrest in Children

Initial Findings of the Pediatric Perioperative Cardiac Arrest (POCA) Registry

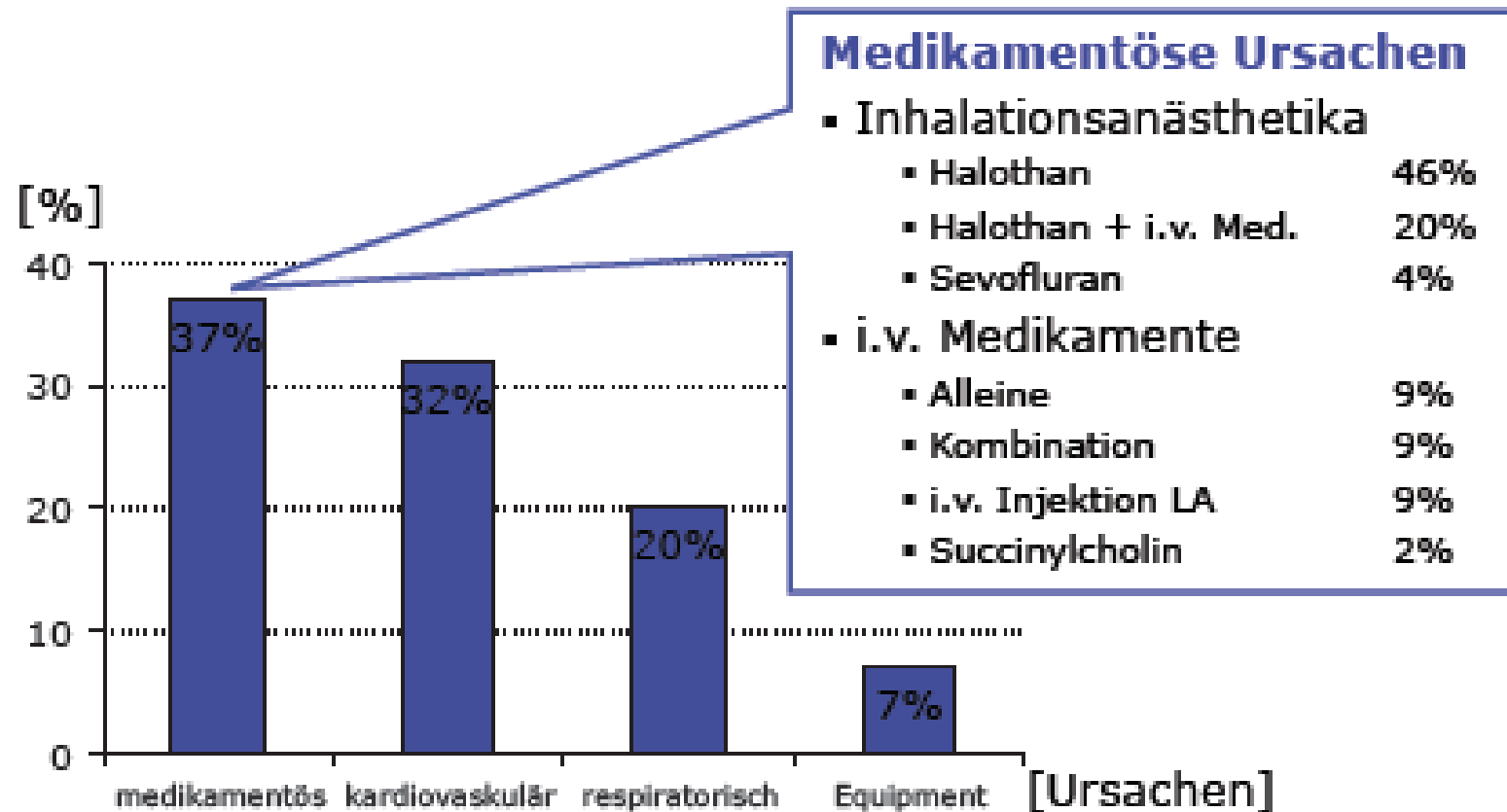
Jeffrey P. Morray, M.D.,* Jeremy M. Geiduschek, M.D.,† Chandra Ramamoorthy, M.B., B.S., FRCA,† Charles M. Haberkern, M.D., M.P.H.,† Alvin Hackel, M.D.,‡ Robert A. Caplan, M.D.,§ Karen B. Domino, M.D., M.P.H.,|| Karen Posner, Ph.D.,# Frederick W. Cheney, M.D.**

- ▶ Schirmherrschaft ASA, AAP
- ▶ 1994-1998: 63 Kliniken, freiwillige Teilnahme
 - 75% Universitäten/Lehrkrankenhäuser
 - 40% Kinderkliniken
- ▶ Standardisiertes Protokoll für Herzstillstände < 18 J.
 - [= Notwendigkeit von Herzdruckmassage oder Tod]
- ▶ Analyse Ätiologie + Outcome

Morray JP et al. Anesthesia-related cardiac arrest in children. Initial findings of the pediatric perioperative cardiac arrest (POCA) registry. *Anesthesiology* 2000; 93:6-14.



Mortalität: POCA-Registry



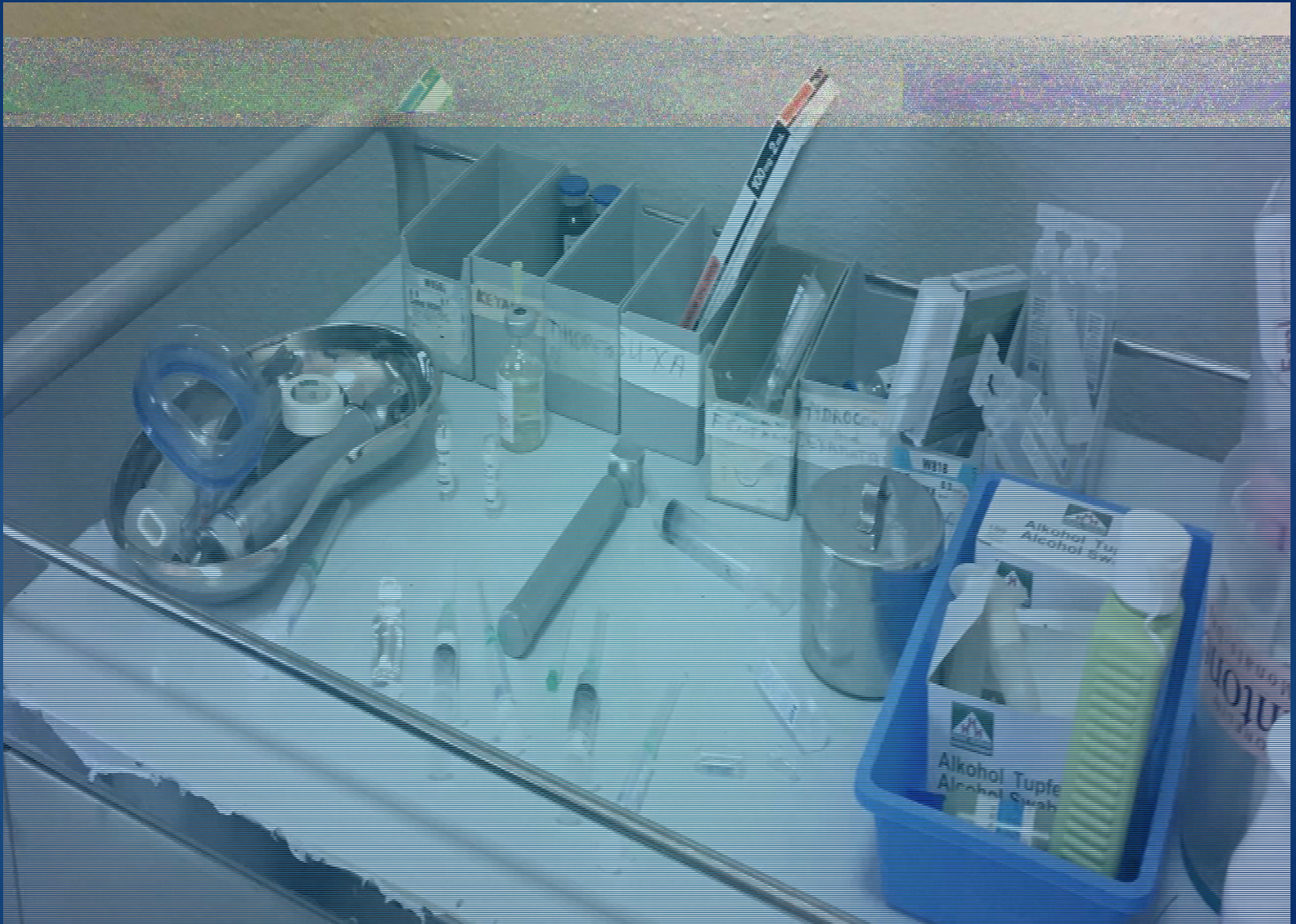
Murray JP et al. Anesthesia-related cardiac arrest in children. Initial findings of the pediatric perioperative cardiac arrest (POCA) registry. *Anesthesiology* 2000; 93:6-14.



Medikamentöse Ursachen - Halothan

- ▶ 66% der Herzstillstände während Einleitung
- ▶ Mittlere Halothan-Konzentration 2%
- ▶ Begleitfaktoren:
 - Assistierte/Kontrollierte Beatmung
 - Schwieriger Venenzugang, mehrere Punktionsversuche
- ▶ 34% während Aufrechterhaltung
- ▶ Median Alter: 6 Monate (5 Tage – 7 Jahre)
- ▶ 3 Todesfälle, 2 bleibende neurologische Schäden

Murray JP et al. Anesthesia-related cardiac arrest in children. Initial findings of the pediatric perioperative cardiac arrest (POCA) registry. *Anesthesiology* 2000; 93:6-14.



Neuste Studie - Mortalität



Incidence of severe critical events in paediatric anaesthesia (APRICOT): a prospective multicentre observational study in 261 hospitals in Europe

*Walid Habre, Nicola Disma, Katalin Virag, Karin Becke, Tom G Hansen, Martin Jöhr, Brigitte Leva, Neil S Morton, Petronella M Vermeulen, Marzena Zielinska, Krisztina Boda, Francis Veyckemans, for the APRICOT Group of the European Society of Anaesthesiology Clinical Trial Network**

Summary

Lancet Respir Med 2017;
5: 412-25

Published Online
March 28, 2017

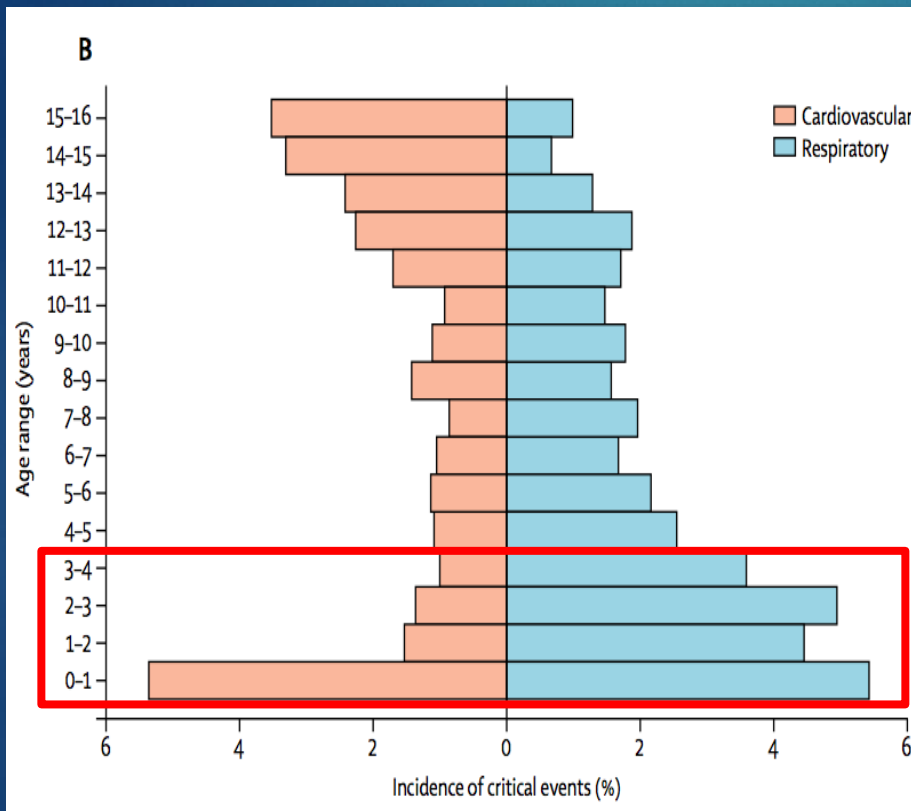
Background Little is known about the incidence of severe critical events in children undergoing general anaesthesia in Europe. We aimed to identify the incidence, nature, and outcome of severe critical events in children undergoing anaesthesia, and the associated potential risk factors.

Lancet Respiratory Medicine 2017; 5:412-425

Ergebnisse

- ▶ 30.784 Kinder (D: 2.229), 31.127 Anästhesien/Sedierungen
- ▶ 88% aller Anästhesien der 2-Wochen-Periode (D: 89%)
- ▶ Inzidenz schwerer Komplikationen **5.2%** (95% CI 5.0 – 5.5%)
- ▶ 30d-Mortalität 0.1% (n=30, 95% CI 0.07 – 0.14)
 - ▶ Sehr große Variabilität bzgl. Verfahren
 - ▶ 40 verschiedene Kombinationen „Prämedikation“
 - ▶ 100 verschiedene Kombinationen „Einleitung“
 - ▶ Über 80 verschiedene Infusionslösungen

Komplikationen - Altersabhängigkeit



“The ROC analysis suggests that children younger than 3–3.5 years should be managed by tertiary care providers or by anaesthesiologists with specific paediatric training to reduce the occurrence and improve the outcome of peri-anaesthetic severe critical events.”

Nicht spezialisierte Anästhesisten verursachen mehr Komplikationen

- ▶ Kreislaufstillstand ¹
- ▶ Bradykardie ²
- ▶ Laryngospasmus ^{3,7}
- ▶ Atemwegskomplikationen ^{4,6,7}
- ▶ Komplikationen insgesamt ^{5,6}

¹ Keenan RL et al. J Clin Anesth 1991

² Keenan RL et al. Anesthesiology 1994

³ Schreiner MS et al. Anesthesiology 1996

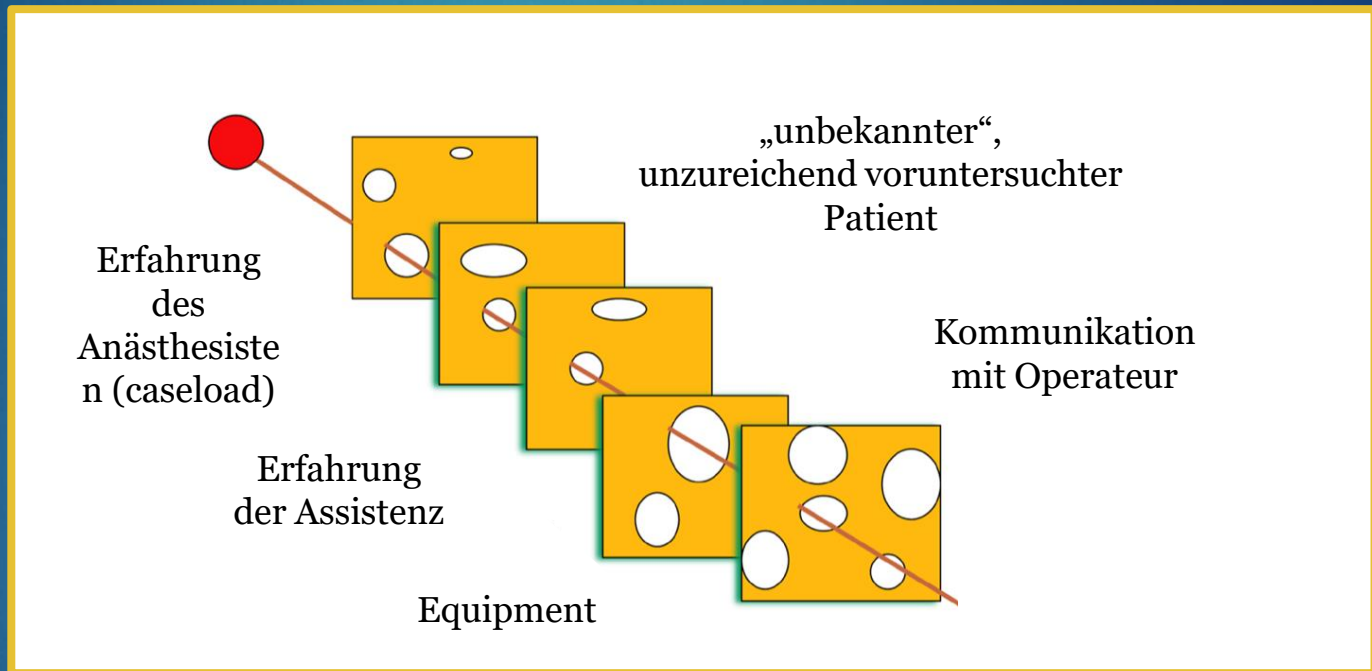
⁷ v Ungern-Sternberg et al. The Lancet 2010

⁴ Mamie C et al. Ped Anesth 2004

⁵ Auroy Y et al. Anesth Analg 1997

⁶ Murat I et al. Ped Anesth 2004

Fehlerursachen: Schweizer Käse Modell





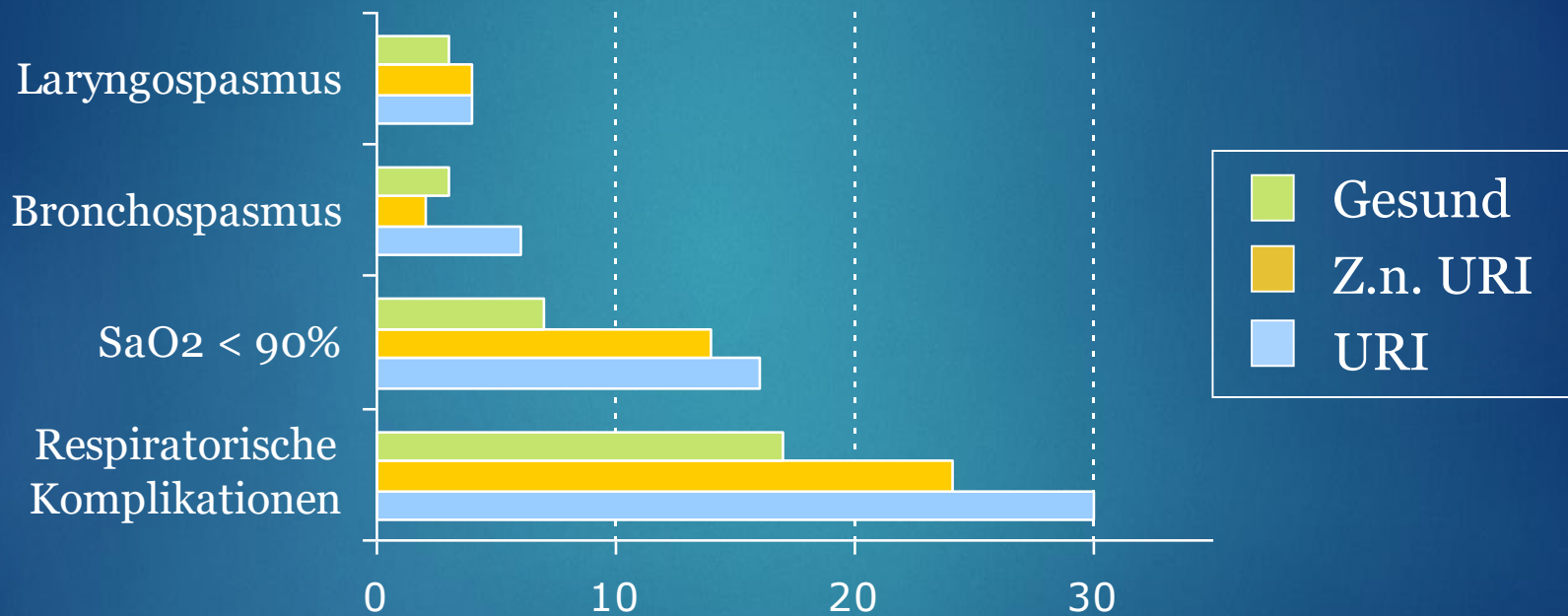
Patientenauswahl – „Kontraindikationen“

- ▶ Ehem. FG (bis 60. p.konz. Woche)
- ▶ Säugl. mit SIDS-Anamnese i.d. Familie
- ▶ Asthma, Vitium c., Epilepsie, Diabetes
instabil bzw. medik.unbefriedigend eingest.
- ▶ Anämie, Hypovolämie
- ▶ Frage nach Allergien, Besonderheiten in Eigen – u.
Familienanamnese

Präop. Untersuchungen/ Therapeutische Vorgaben

- ▶ ANAMNESE ?
- ▶ Klinische Untersuchung!
- ▶ Laborwerte/EKG/ Sono/Rö ?
- ▶ Spez. therapeutische Vorgaben bei Kindern mit Asthma bronch., Epilepsie, Diabetes
- ▶ Problem: Kinder mit Inf. o. L.

Respiratorische Komplikationen, URI



Tait AR et al. Risk factors for perioperative adverse events in children with URI.
Anesthesiology 2001; 95:299-306.

TIPP

- ▶ Auskultationsbefund: Giemen, Spastik
- ▶ Inhalation mit β_2 -Mimetika via Aerohalin-Chamber
- ▶ Erneute Auskultation nach 8-10', dann entscheiden!

Salbutamol premedic. in children with a recent resp. tract infect. Von Ungern-Sternberg B.: Ped.Anesth.(2009)1064f



Kasuistik 1a

Korrektur komplexe LKG

- ▶ 4j. Junge, Anam.:Leer; Unters.:schwierig
- ▶ Schw.Venenverh.; langwier.Ma.einl.(Iso)
- ▶ Relax. 0,6mg/kg Esmerol
- ▶ Intub. Woodbr.(5) Führungsstab

Schwierige Intubation!

Maskenbeatmung auch mit hohem Druck

nicht suffizient, SaO₂ 70%



Kasuistik 1b

- ▶ Nach Intubation, keine Verbesserung der Beatmungssituation, allenfalls sehr diskret Giemen auskultierbar,

Was tun? (If in doubt take it out)?

- ▶ Magen entlastet, mehrfach β_2 -Mimetika via T.
- ▶ allmähliche Verbesserung der resp.Sit.

Diagnose: Schw.Intubat.+Bronchospasmus

- ▶ ggf. Tubuslage kontrollieren, nicht sofort extub.
- ▶ Adrenalin dosis –u. applikations simpel bereith.

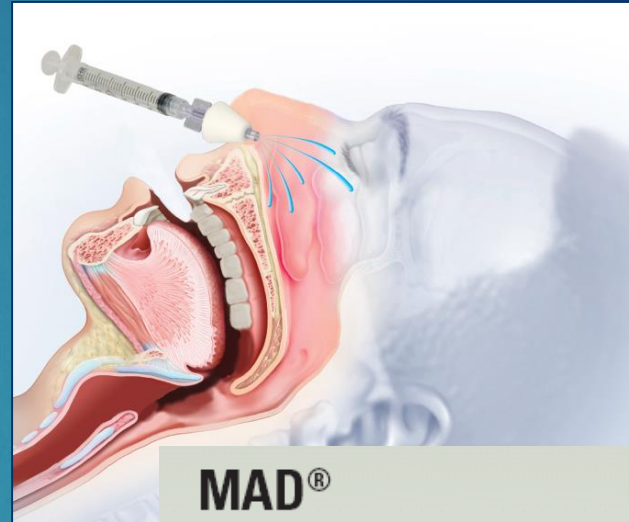
Prämedikation?



Sedierung



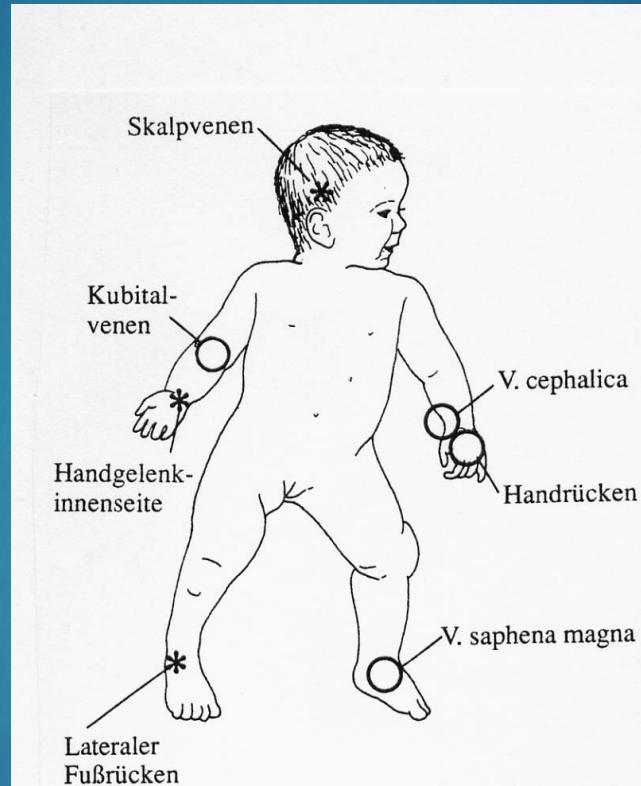
- ▶ S-Ketamin 2 mg/kg
- ▶ + Midazolam 0,4 mg/kg
- ▶ Fentanyl 2 my/kg



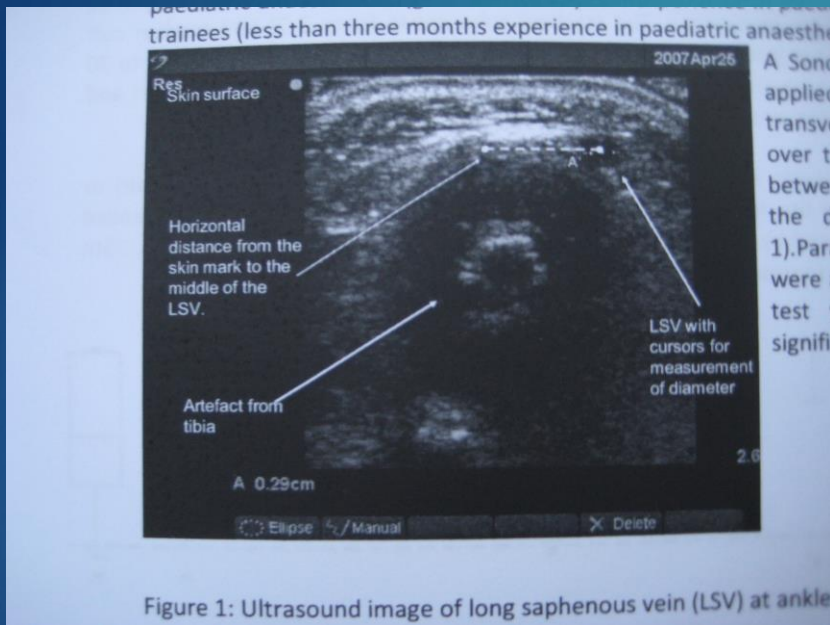
MAD[®]
Mucosal Atomization
Device

Weber F et al. Premedication with nasal s-ketamine and midazolam provides good conditions for induction of anesthesia in preschool children. Can Journal Anesth 2003; 50:470-475

Mögliche Punktionsorte

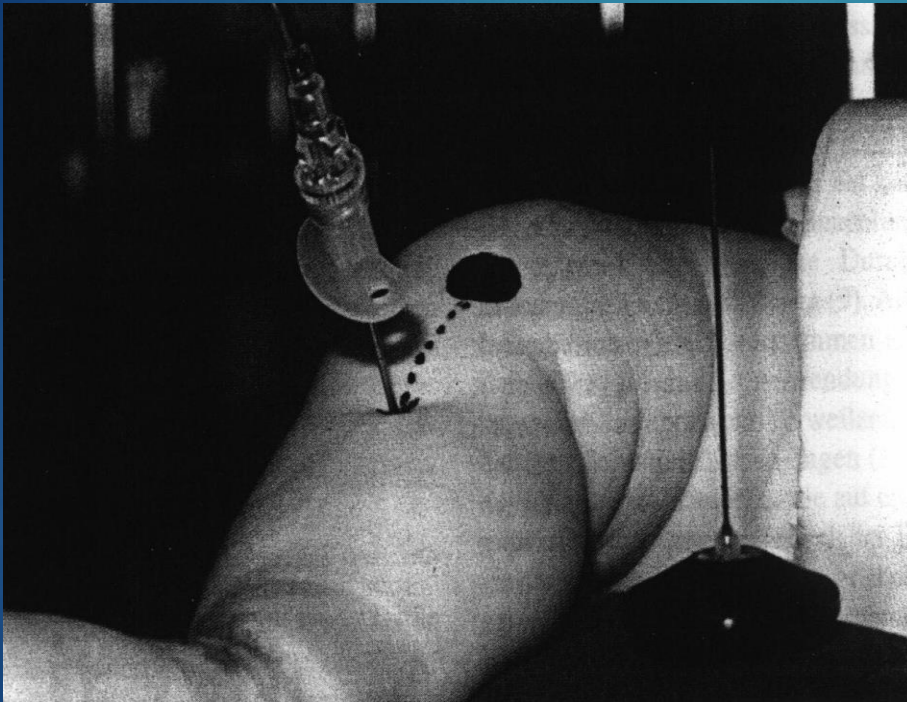


Blindversuch V.saphena Pkt.



Mandar Joshi(2008)APA London: 33% erfolgreiche Punktion durch erfahrene Kinderanästhesisten

Intraossäre Kanülen



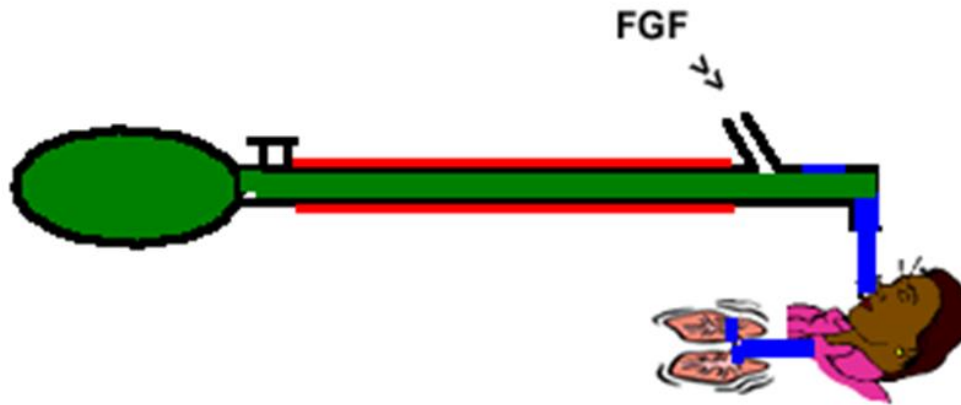
Cook-Nadel

Gas oder TIVA? LMA oder Intubation?

- ▶ Gase: was vor Ort ist! → Was ist im Vapor?
- ▶ Balancierte Anästhesie:
Ketamin! Trapanal, Propofol, Fentanyl
TIVA?
- ▶ Intubation, LMA (Propofol)
- ▶ Relaxation: Mivacurium, (Succi!) Rocuronium



Handbeatmung



Mapleson D

Larynxmaske die Alternative?



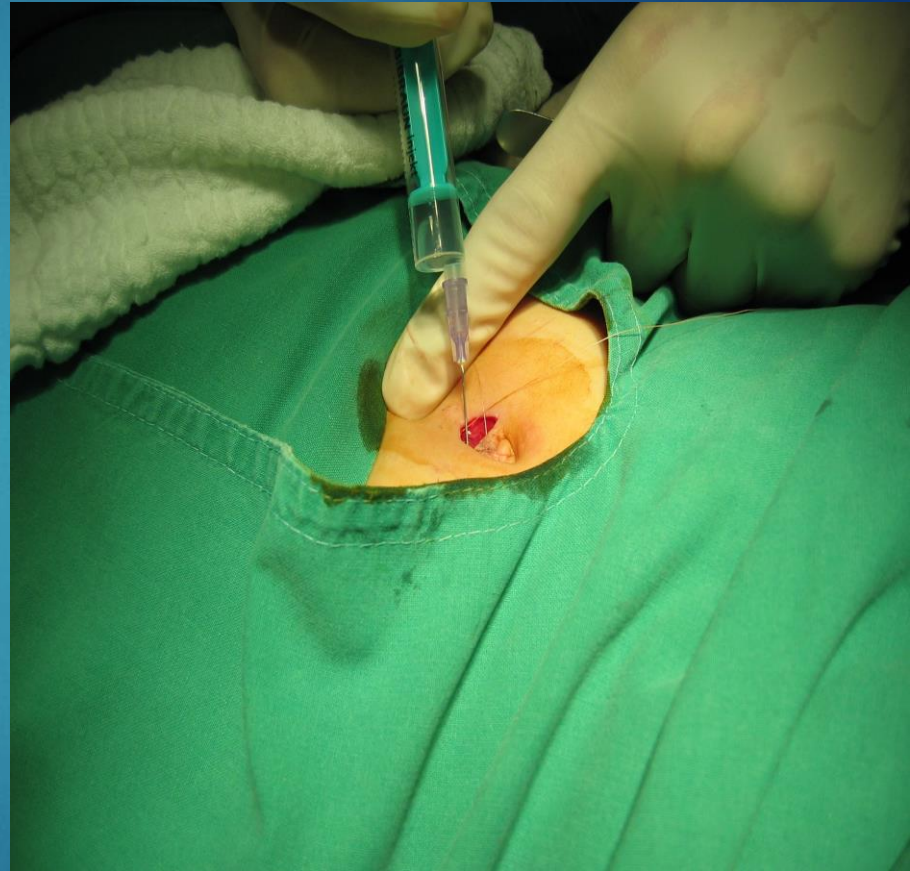
Körpergewicht	Größe
< 5 kg	1
5 – 10 kg	1 1/2
10 – 20 kg	2
20 – 30 kg	2 1/2

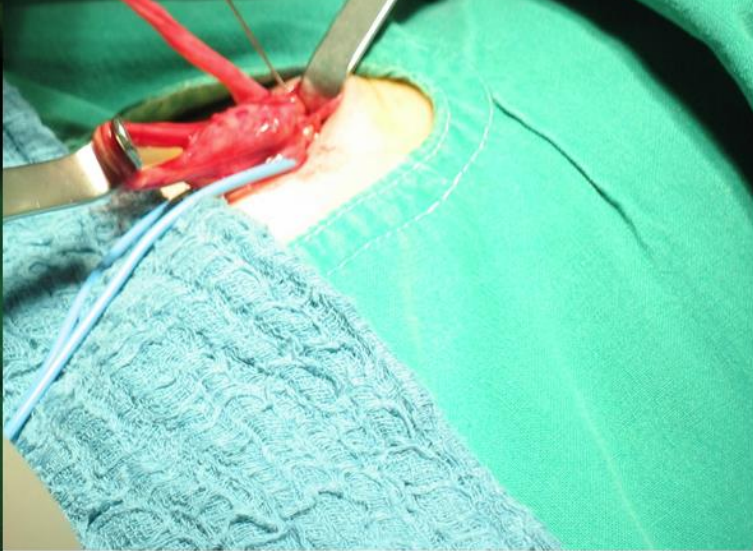
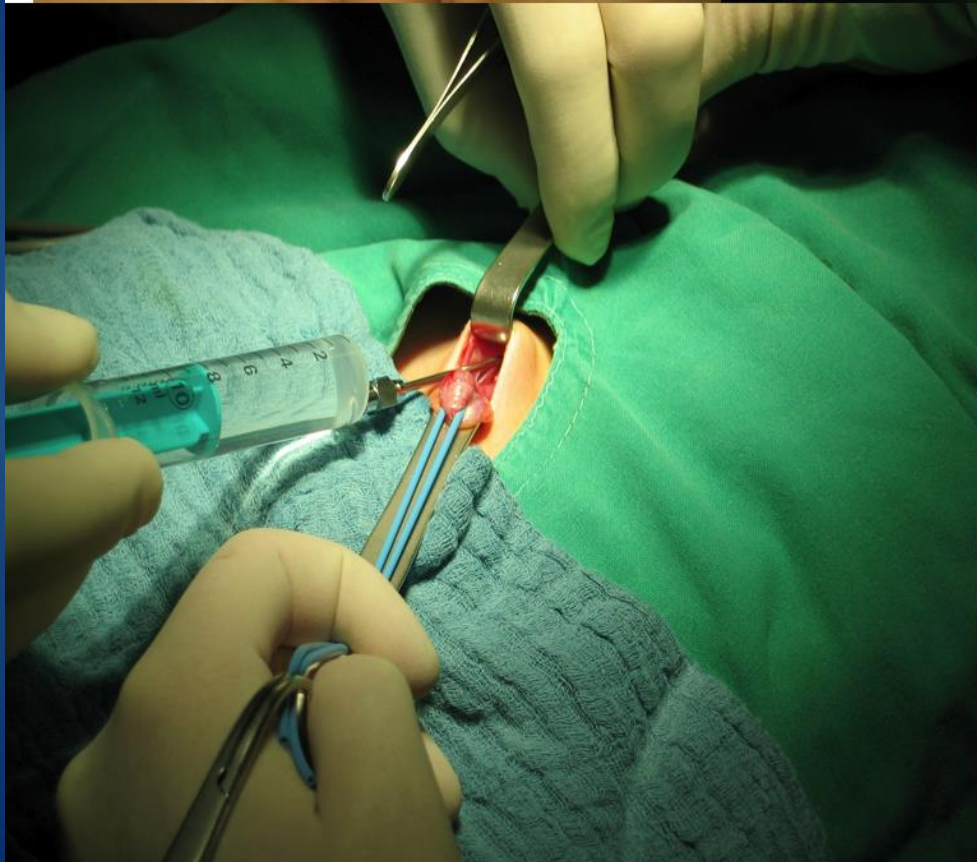
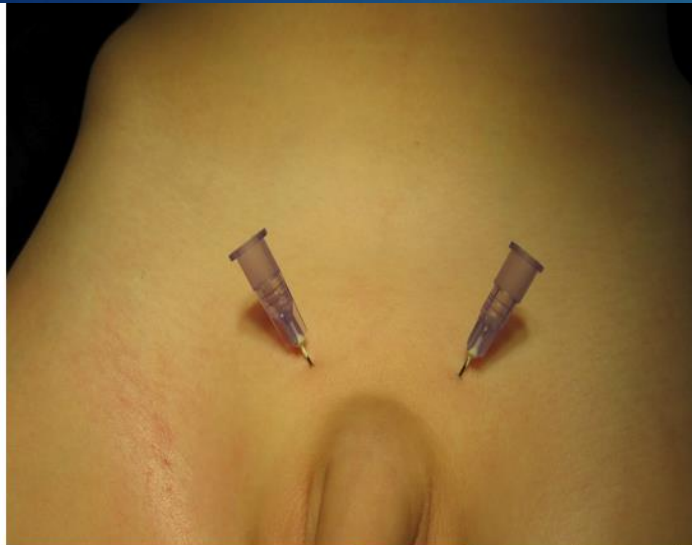


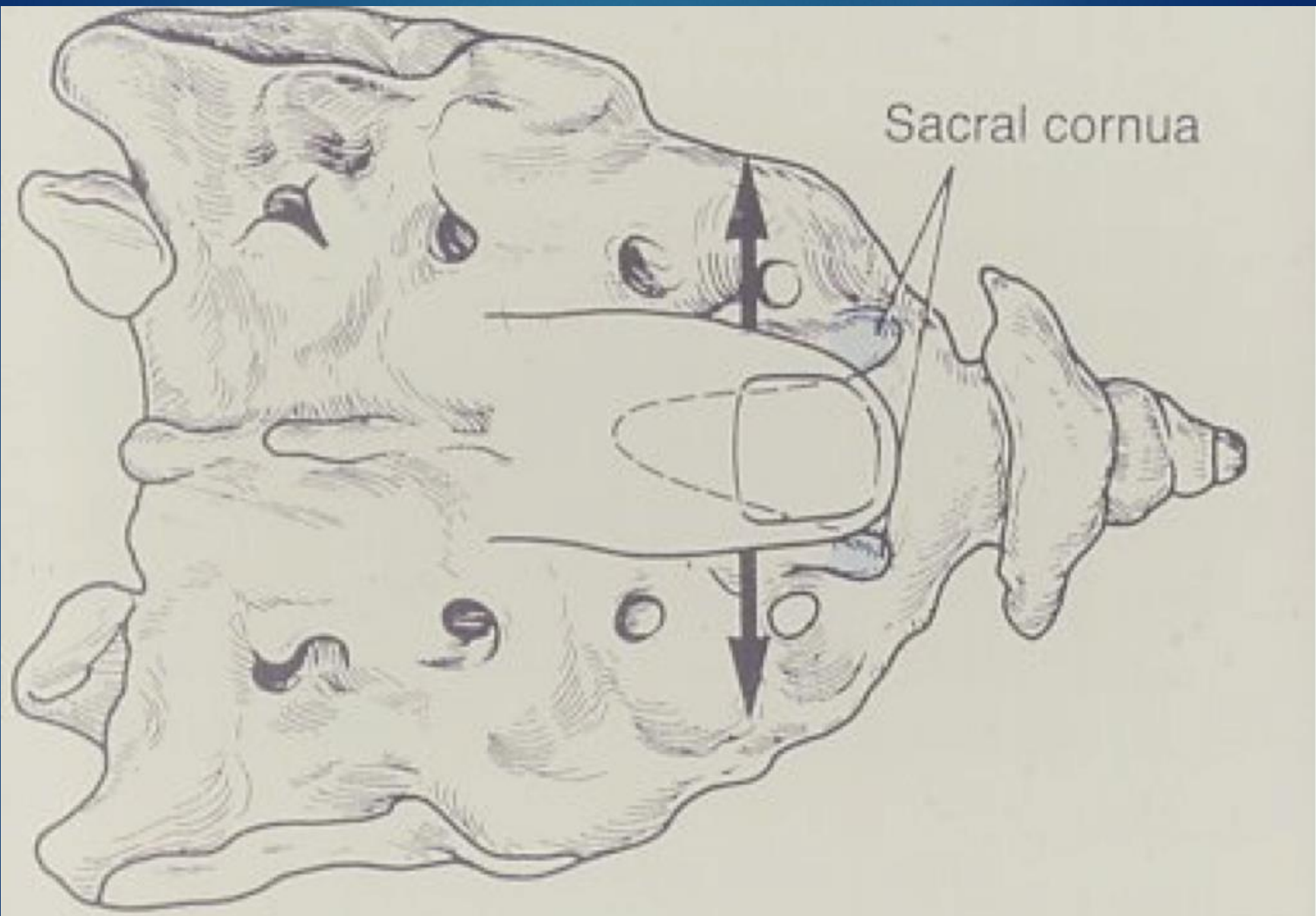


Regionalanästhesie

„a local analgesic technique should be used in all cases unless there is a specific reason not to do“







Sacral cornua

PARACETAMOL

- ▶ Dos.: 10-15mg/kg oral, 30-40 mg/kg rektal, 100mg/kg Maximaldosis, 150mg/kg (tox.Dosis)
i.v. Applikation Perfalgan: 7,5mg/kg; max 30mg(TD); verzögerter Wirkungseintritt
- ▶ Wirkzeit : 4-5 Stunden, Resorptionszeit interindividuell diff.; max 2-3 h
- ▶ NW: hepatotoxisch , max. Dosis nur 2-3 Tage (Kearns GL et al.J Pediatr.(1995)132:5

Ibuprofen

Dos.: 10-15 mg/kg Einzeldos, max. 40mg/kg/d, oral

▶ Pharmakokinetik Ibuprofen 20 mg/kg

Kyllönen et al. Ped.Anesth.(2005)15,566f

Österr.: iv Zulassung: ab 20 kg; 6Jahre; 5-10mg/kg,max 30

Orale Bioverfügbarkeit höher als rektal!

▶ Wirkzeit: 4-5 Stunden

▶ potenter als PCM und sicherer

▶ NW: NSAR – typisch; kein erhöhtes Bronchospasmus
-risiko bei Asthmakindern

Lesko et al.Pediatrics (2002)109f

Metamizol

- ▶ Dosis: 15-20mg/kg/; TMD 100mg; 3mg/kg/h
- ▶ Vorteil: Appl. i.v.!.; oral; rektal
- ▶ Wirkzeit: 3-4 Stunden
- ▶ NW: extrem selten Agranulozytose,
„vasomotorischer“ Schock bei rascher i.v. Injektion!
- ▶ Vorteil: potente Analgesie u.Spasmolyse!

Nalbuphin

- ▶ Nalbuphin ist ein μ -Antagonist und κ -Agonist, Analgesie und v.a. Sedierung
- ▶ Einzeldosis iv ,Einzeldosis nasal, Dauerinfusion
- ▶ 0.1 - 0.2 mg/kg ; 40-100 μ g/kg/h
- ▶ grosse therapeutische Breite
- ▶ ungenügende Wirkungsintensität bei schweren Schmerzen („ceiling effect“)
- ▶ Nausea und Erbrechen
Sedierung

Morphin

- ▶ Standardsubstanz; am besten untersucht
- ▶ Dos.: 0,05-0,1 mg/kg/KG (Bolus)
- ▶ Wirkzeit: 3-4 Stunden
- ▶ Cave: Säuglinge bis 1 Mon. verl. HWZ

- ▶ **Pethidin** Dosis: 0,25 – 0,7 mg/kg i.v.
- ▶ Cave: Metabolit: N.pethidin excitator. Potential







Kontroversen

- ▶ Jacob R. Pro: Anesthesia for children in the developing world should be delivered by medical anesthetists.

Pediatr Anesth 2009; 19:35

- ▶ Wilson IH. Con: Anesthesia for children should be provided by medical anesthetists.

Pediatr Anesth 2009; 19:39

- ▶ Gathuya Z. Pro: Pediatric anesthesia in developing countries is best achieved by selective out of country scholarships.

Pediatr. Anesth 2009; 19: 42–44

- ▶ Walker IA. Con: Pediatric anesthesia training in the developing countries is best achieved by out of country scholarships.

Pediatr Anesth 2009; 19: 45–49

Anästhesisten für Eritrea - „Ausbildung ist das, was bleibt“

Christine Bayha¹, Traudl Elsholz, Lothar P. Klimpel

Anästhesiol Intensivmed Notfallmed Schmerzther 2016;
51(10): 640-643

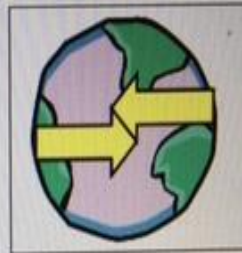
Traudl Elsholz leitet das Projekt in der Hauptstadt Asmara. Sie strukturiert die Ausbildung und koordiniert die Einsätze deutscher Ärzte, wie z. B. die von Dr. Lothar Klimpel.



Organisationen & Ansprechpartner

ANAESTHESIE IN

ENTWICKLUNGSLÄNDERN e.V.



Anaesthesia in Developing Countries e.V., D-37099 Göttingen

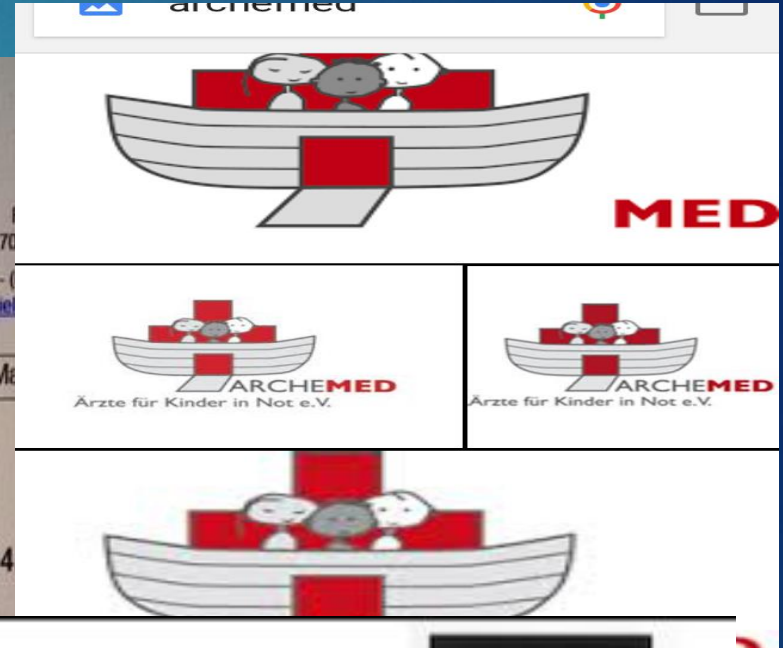
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E-Mail: fmied

21. Ma

Protokoll der Mitgliederversammlung im Rahmen des Deutschen Anästhesiekongresses DAC 2017 (03. – 05. Mai in Nürnberg) Donnerstag, 04



INTERPLAST - Germany e.V.

Gemeinnütziger Verein für Plastische Chirurgie in Entwicklungsländern
Sektion Vreden

Sektionsleitung: Dr. Arnulf Lehmköster, Silvia Schroer

Geschäftsstelle: St. Marien-Hospital Borken, Am Boltenhof 7, 46325 Borken

Tel.: 02861/973391 – Fax: 02861/9753391

Internet-Adresse: www.interplast-germany.de

