Анестезіологія та ультразвук – сучасний стан питання

С.І.Воротинцев, М.М.Софілканич

Запорізький державний медичний університет

Київ
25-26 жовтня
2012

“In the country of the blind the one-eyed man is king”

Erasmus

Ultrasonography in pain medicine: “Opening the third eye”

Pain clinical updates, June 2012

1. Немного истории
2. УЗ в современной анестезиологии
3. Обучение желающих (личный опыт)
4. Как научить всех?

Internal Jugular Vein Location with the Ultrasound Doppler Blood Flow Detector

JAMES I. ULLMAN, MD*
ROBERT K. STOELTING, MD†
Indianapolis, Indiana‡

MANY technics utilizing various anatomical landmarks have been described for location of the internal jugular vein.[1] Despite strict adherence to the described technics, the internal jugular vein may not be located when percutaneous catheterization is attempted or inadvertent carotid artery puncture may occur. Furthermore, anatomical landmarks may be difficult to define, particularly in obese, short-necked individuals or pediatric patients. We have utilized an ultrasound Doppler blood flow detector to determine transcutaneously the precise location of the internal jugular vein as it traverses the neck.

METHODS AND RESULTS

The supine awake or anesthetized patient is placed head-down with the head turned maximally to the left for location of the right internal jugular vein. Starting near the midline at the level of the thyroid cartilage, an ultrasound Doppler pencil-shaped flow detector probe is moved laterally until the characteristic pulsatile sound of blood flow in the carotid artery is audible. This area is noted with a marking pencil and the probe then moved further laterally until blood flow in the internal jugular vein is detected. The low-velocity venous flow produces a more continuous low-frequency signal that may be described as a "windstorm" or "hum." This site is also marked and the process repeated 3 to 5 cm above and below the original markings to delineate the course of the artery and vein. In our experience with adult patients the internal jugular vein is 1 to 3 cm lateral and parallel to the carotid artery. The needle or catheter is then inserted along the line corresponding to the internal jugular vein. Although we feel the pencil-shaped probe is the easiest and most reliable of the probes for this technic, we have also successfully used the flat probe designed for arterial pressure monitoring, as well.

DISCUSSION

Location of the internal jugular vein with the ultrasound Doppler blood flow detector takes the "guesswork" out of finding the vein prior to catheterization. It is essential that the head be turned maximally before locating the blood vessels. This serves to tense the skin over the vessels and, we feel, to place the internal jugular vein in a position more lateral and parallel to the carotid artery. Obviously, landmarks determined with the flow probe become meaningless should skin movement occur before attempted internal jugular vein catheterization.

We conclude that location of the internal jugular vein with an ultrasound Doppler pencil-shaped flow probe offers a practical and easily applied improvement on technics dependent on anatomical landmarks. Although we have used this approach most extensively in adults, it would seem equally applicable in younger age groups or other patients, such as the short-necked or obese individual, in whom anatomical landmarks are equivocal. Its use should increase the success rate of internal jugular vein catheterization while reducing inadvertent carotid artery puncture. Although, some readers may feel that the use of this Doppler technic is not necessary in the routine patient in the operating room, they may find it more applicable in the postsurgical patient where the anatomy of the neck may be distorted.

REFERENCE

1. Defalque RJ: Percutaneous catheterization of the internal jugular vein. Anesth Analg 53:116-121, 1974

*Assistant Professor of Anesthesiology
†Professor of Anesthesiology and Pharmacology
‡Department of Anesthesia, Indiana University School of Medicine, Indianapolis, Indiana 46202
Accepted for publication: April 25, 1977

История

1. US vs LM
2. Younger age groups
3. Short-necked or obese
4. No routine
5. Neck anatomy distort

JAMES I. ULLMAN, MD
ROBERT K. STOELTING, MD
Indianapolis, Indiana 1978

Br. J. Anaesth. (1978), **50**, 965

APPLICATION OF THE DOPPLER ULTRASOUND BLOODFLOW DETECTOR IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK

P. DU P. LA GRANGE, P. A. FOSTER AND L. K. PRETORIUS

SUMMARY

A Doppler ultrasound bloodflow detector was used to localize the third division of the subclavian artery, rendering the supraclavicular approach to the brachial plexus safer and highly successful.

The supraclavicular approach for a brachial plexus block is a technique favoured by many as it produces a more extensive area of blockade than the axillary approach for the same dose of local anaesthetic. However, the risk of pneumothorax and, to a lesser extent, of arterial puncture and haematoma formation is less with the axillary approach, although puncture is made through skin with a high population of micro-organisms. Any method which may decrease the problems of the supraclavicular approach warrants attention. The method described here has reduced the risks and made it possible to carry out supra-clavicular brachial plexus blocks successfully in the obese patient or where the normal anatomy is distorted. No complications have been encountered.

METHOD

The major nerve trunks lie close to the major vessels. We have used a standard 9.5-mHz ultrasonic Doppler bloodflow detector for the localization of the subclavian artery. On the basis of a constant relationship between the third division of this artery and the six divisions of the three trunks of the brachial plexus, accurate placement of local anaesthetic drug should be possible. Sixty-one adult patients undergoing orthopaedic procedures were anaesthetized. The patient was positioned supine with the arm to be blocked at the side and the chin fully rotated in the opposite direction. The shoulder was depressed as far as possible. Palpation of the subclavian artery above the midclavicular point was attempted. If there was any doubt about its location, the Doppler probe head containing transmitting and receiving elements was applied over the area using a sterile coupling jelly. The artery and its accompanying vein were then located precisely and marks made with a water-soluble dye on the skin outside the area to be sterilized (figs 1, 2). The puncture area was cleansed and sterilized. A skin weal was raised with local

FIG. 1. Position of Doppler probe head and skin marks.

P. DU P. LA GRANGE,* ARTS DRS.(MED.), M.MED.(ANAES.), Department of Anaesthesia; P. A. FOSTER, M.B. CH.B. (U.C.T.), D.A.(ENGLAND), D.A.R.C.P. & S.I., F.F.A.R.C.P. & S.I., Department of Anaesthesia; L. K. PRETORIUS, M.B. B.CH., B.A.O., F.R.C.S.(I), Department of Orthopaedics; Tygerberg Hospital, Tygerberg, C.P., Republic of South Africa.

* Present address: Launceston General Hospital, Launceston, Tasmania.

Correspondence to L. K. P., P.O. Box 63, Tygerberg 7505, Republic of South Africa.

0007–0912/78/0050–0965 $01.00

История

1. Subclavian artery
2. Brachial plexus
3. Safe and high success

P. DU P. LA GRANGE,
P. A. FOSTER, L. K. PRETORIUS
Republic of South Africa 1978

Anesthesiology
52:513–516, 1980

Ultrasonic Localization of the Lumbar Epidural Space

RANDALL C. CORK, M.D., PH.D.,* JOSEPH J. KRYC, M.D.,† ROBERT W. VAUGHAN, M.D.‡

Ultrasound imaging applications in anesthesiology have been limited. Barash *et al.*[1] and Rathod *et al.*[2] used ultrasound to assess effects of volatile anesthetics on cardiovascular hemodynamics. Other medical specialties employ ultrasound for real-time imaging to guide needle placement for aspiration of renal cysts,[3] amniocentesis,[4] and pericardiocentesis,[5] and to measure the diameter of the spinal canal.[6]

* Chief Resident.
† Resident.
‡ Associate Professor.
Received from the Department of Anesthesiology, University of Arizona, Health Sciences Center, Tucson, Arizona 85724. Accepted for publication December 17, 1979. Presented at the annual meeting of the American Society of Anesthesiologists, October 1979.
Address reprint requests to Dr. Cork.

An extension of ultrasound scanning in anesthesiology may be identification of the epidural space for correct needle positioning. The purpose of this communication is to demonstrate the use of ultrasound for landmark identification for lumbar epidural anesthesia.

METHODS AND MATERIALS

This study was approved by the Arizona Health Sciences Center Human Subjects Committee. All patients gave informed consent. Thirty-six patients, 22 male and 14 female, scheduled for procedures involving epidural needle puncture were studied. Real-time scanning was performed with an Air-Shields® Sono Scan™ Ultrasonic Scanner (Model SSD-202).

История

ultrasound scanning in anesthesiology may not yet be clinically feasible, further developments in image-processing and transducer design may have significant impact on regional anesthetic techniques in the near future.

RANDAL C. CORC,
JOSEPH J. KRYC,
ROBERT W. VAUGHAN
Tucson, Arizona 1980

AMA

- Resolution 802
- "The AMA affirms that ultrasound imaging is within the scope of practice of appropriately trained physicians."
- American Medical Association House of Delegates. Privileging for ultrasound
- imaging. Resolution 802, Dec 1999; Reaffirmed; Sub. Res 108, Jun 2000. H-230.960.
- Available at: http://www.ama-assn.org. Accessed July 9, 2007.

ACEP

Emergency Ultrasound Guidelines.
Approved by the ACEP Board of Directors, June 1, 2001.

http://www.acep.org/NR/rdonlyres/8024079E-28E8-4875-93E6-6867EA705A2A/0/ultrasound_guidelines.pdf

2002

NHS

National Institute for Clinical Excellence

Guidance on the use of ultrasound locating devices for placing central venous catheters

1. Guidance

1.1 Two-dimensional (2-D) imaging ultrasound guidance is recommended as the preferred method for insertion of central venous catheters (CVCs) into the internal jugular vein (IJV) in adults and children in elective situations.

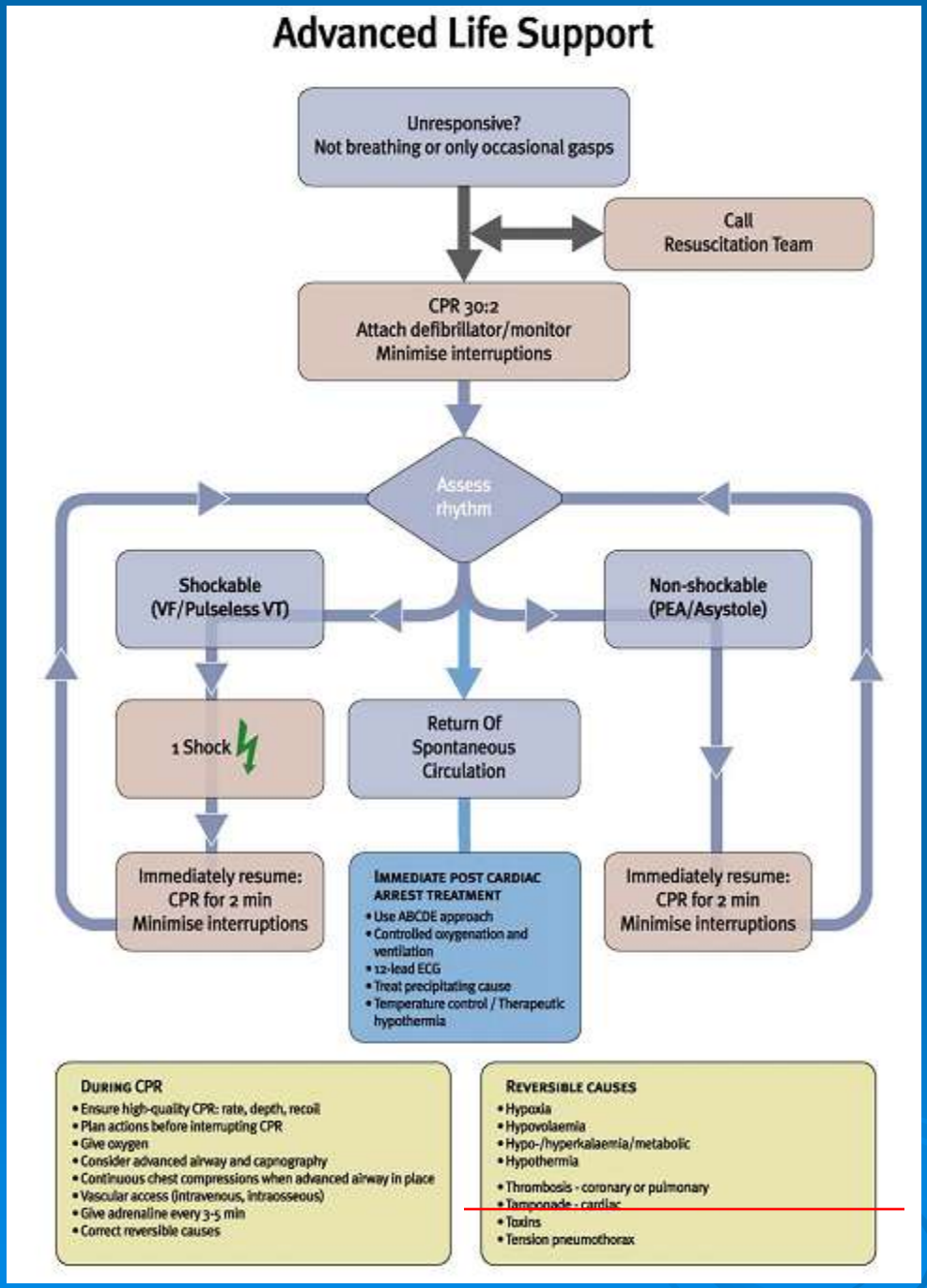
1.2 The use of two-dimensional (2-D) imaging ultrasound guidance should be considered in most clinical circumstances where CVC insertion is necessary either electively or in an emergency situation.

1.3 It is recommended that all those involved in placing CVCs using two-dimensional (2-D) imaging ultrasound guidance should undertake appropriate training to achieve competence.

1.4 Audio-guided Doppler ultrasound guidance is not recommended for CVC insertion.

The National Institute for Health and Clinical Excellence is examining ultrasound-guided catheterisation of the epidural space and will publish guidance on its safety and efficacy to the NHS in England, Wales, Scotland and Northern Ireland. The Institute's Interventional Procedures Advisory Committee has considered the available evidence and the views of Specialist Advisers, who are consultants with knowledge of the procedure. The Advisory Committee has made provisional recommendations about ultrasound-guided catheterisation of the epidural space.

Bruce Campbell
Chairman, Interventional Procedures Advisory Committee
September 2007



European Resuscitation Council Guidelines for Resuscitation 2010

The potential role of ultrasound imaging during ALS is recognised

Pre-congress Course

08.06.2012 14:00-18:00 09.06.2012 08:00-12:00 Room 342AB

04CC1 Ultrasound use in critical care and anaesthesia

Basics
Machine
Safety
Vascular access
Aorta and large vessels
Abdomen and kidneys
Lung
Critically ill patient
Transthoracic and transesophageal imaging
Cardiac
Hemodynamic monitoring

Wouters, Patrick
Gent, Belgium

Refresher Course

09.06.2012 13:00-13:45 Amphitheatre Havane

08RC1 Current concepts of ultrasound in regional anaesthesia

(CME Topic 6. 'Guidance methods for peripheral and central regional blocks')

Speaker:
Marhofer, Peter
Vienna, Austria

Hollmann, Markus W.
Amsterdam, Netherlands

10.06.2012 17:00-17:45 Amphitheatre Bordeaux

12RC2 Echocardiography in the ICU (CME Topic 12)

Guarracino, Fabio
Pisa, Italy

Speaker:
Cholley, Bernard
Paris, France

Workshops

10.06.2012 09:00-12:00 Room 242AB

08W2 Regional Anaesthesia Phantom Workshop 1

Willschke, Harald
Vienna, Austria

10.06.2012 14:00-17:00 Room 242AB

08W3 Regional Anaesthesia Phantom Workshop 2

Eichenberger, Urs
Bern, Switzerland

11.06.2012 16:00-16:45 Room Paris

10W2 Ultrasound-guided vascular access in paediatric anaesthesia

Ingelmo, Pablo
Monza, Italy

Symposium

11.06.2012 08:30-10:00 Salle Passy

GuestS4 Anaesthesia meets ultrasound: vision or evidence?

Symposium organised by the Society for Ultrasound Anaesthesia (SUA)

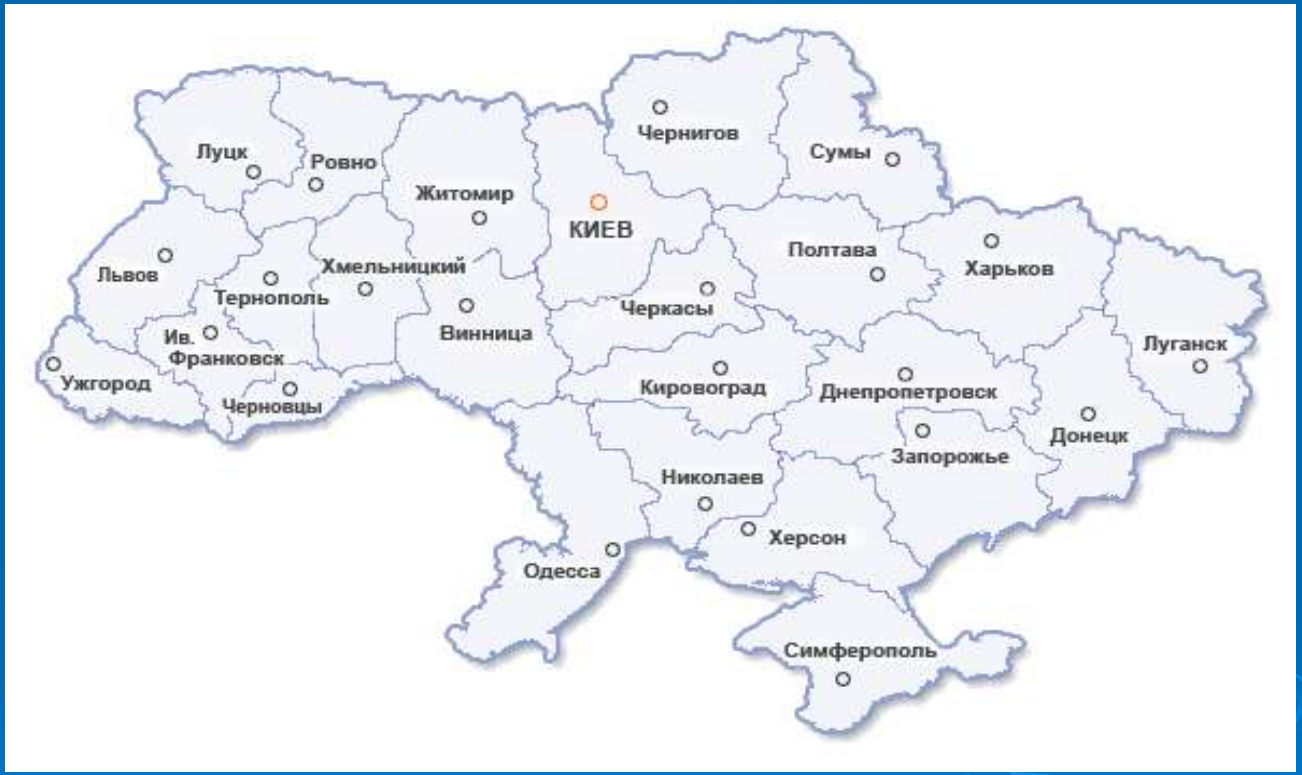
Galante, Dario
Foggia, Italy

Современный анестезиолог это врач, владеющий:

1. Основами УЗ топической диагностики
2. Интервенционными технологиями под контролем УЗ

Ультразвук в анестезиологии Украины

Запорожье
Киев
Днепропетровск
Львов
Харьков
Бердянск
.....?



2008 – 2012 гг.

Обучение желающих (наш опыт)

1. Желание

2. Тандем

3. Интернет-ресурсы

http://www.lsora.co.uk
http://nysora.com
http://neuraxiom.com
http://www.usra.ca

4. Мастер-класс

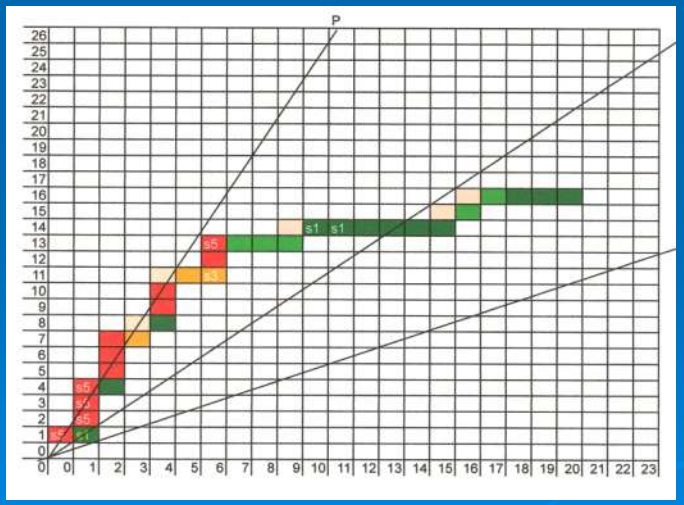
Майстер – клас з реґіонарної анестезії на базі виставки «Таємниці людського тіла The Human Body Exhibition». Місце проведення: НСК «Олімпійський». Модератори: А.М. Строкань, В.С. Фесенко		
11:00-13:00	1. Нерви голови і шиї. 2. Нервові стовбури верхньої кінцівки. 3. Плечове сплетення – надключичні і підключичні доступи.	25.10.2012
09:00-11:00	4. Спинний мозок і паравертебральний простір. 5. Поперекове і крижове сплетення. 6. Нервові стовбури нижньої кінцівки.	26.10.2012

Мастер класс з медицини болю (зал В). Модератори: А.М. Строкань, Дмитро Несен	27.10.2012	
9:00-10:00	Соноанатомія великих суглобів.	О.І. Мухомор
10:00-11.00	М'язево-скелетний біль – тригерні точки.	Р.В. Бубнов
11.00-12:00	Лікування болю в великих суглобах за допомогою ультразвукового контролю.	Дмитро Несен (Нью Йорк)
12:00-12:30	Досвід імплантації програмованих систем для електростимуляції спинного мозку в Україні.	В.В. Білошицький
12:30-13:00	Дискусія, висновки.	

CUSUM
(cumulative summation)
суммирование нарастающим итогом

$$S_n = \sum (X_0 - X_i)$$

Если успех двигайся вдоль оси “x” Если неудача дригайся вдоль оси “y”

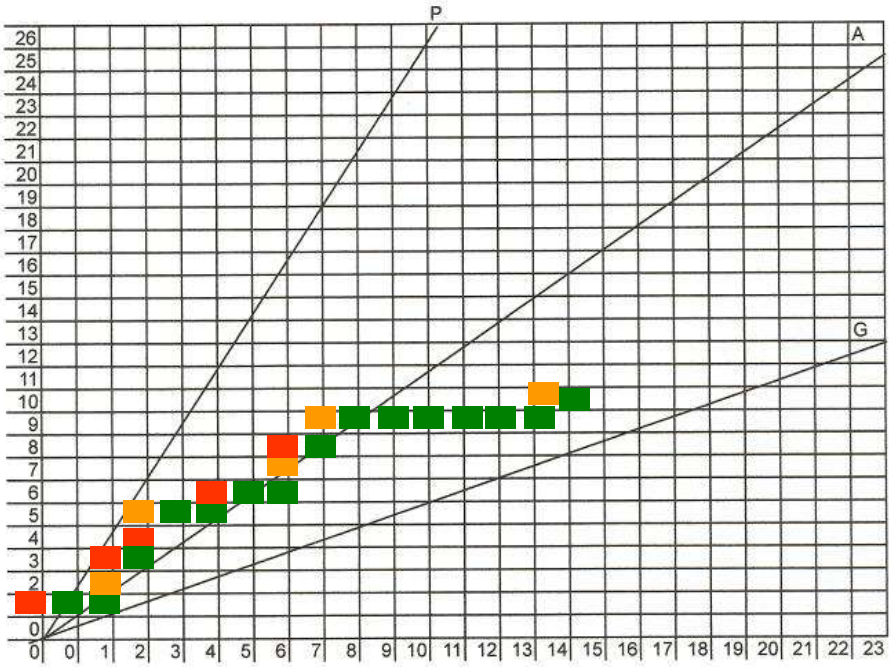


Rafael Blanco: Evaluation of learning 2007

Name Post From To

Interscalene block(USS)

The aim is to achieve 7 consecutive boxes along the x axis



If supervised add a letter s to the key.Example: s1,s2,s3

Key

1 Successful view of roots + anaesthetic block
2 Successful view of roots+ NO anaesthetic block
3 No view of roots

Total succesful blocks

Total failed blocks

Block	Date	Block	Date	Block	Date	Block	Date
1	2/3/07	12	20/3/07	23	27/3/07	34	
2	6/3/07	13	20/3/07	24	29/3/07	35	
3	12/3/07	14	20/3/07	25	29/3/07	36	
4	16/3/07	15	22/3/07	26		37	
5	17/3/07	16	22/3/07	27		38	
6	18/3/07	17	22/3/07	28		39	
7	18/3/07	18	22/3/07	29		40	
8	18/3/07	19	22/3/07	30		41	
9	18/3/07	20	27/3/07	31		42	
10	18/3/07	21	27/3/07	32		43	
11	18/3/07	22	27/3/07	33		44	

Как научить всех?

EMFSUMB (minimum training requirements)

- Theoretical knowledge
- Ultrasound physics,safety,artifacts, anatomy,pathology Sonographic interpretation,scanning and guided techniques
- Indication of minimum no - supervised and independent - (with designated reviewer and trainer)
- Training program - involving training with recognised competent authority - accreditation and evaluation
- Continuing professional education

European Federation of Societies for Ultrasound in Medicine and Biology

Dear members of EFSUMB

You are probably all aware of the document "Minimum training requirements for the practice of medical ultrasound in Europe". If not the document is available on this website, www.efsumb.org.

After a few years of work EFSUMB Education and Professional Standards Committee has developed guidelines for how the minimum training requirements can be achieved at each level of practice. Structured theoretical and practical training should be followed by competency assessment. In the document that follows you will find a description – for some medical specialties – of the theoretical and practical training that the committee recommends and also competency assessment sheets. We hope you will find that these guidelines from the Education and Professional Standards Committee will be helpful.

We would welcome general comments on these recommendations, suggestions for ways in which they could be improved in the future and suggestions for additional syllabuses. Comments should be submitted by email to: efsumb@efsumb.org

Lil Valentin
Chairman of the EFSUMB Education and Professional Standards Committee

Minimum training recommendations for the practice of medical ultrasound

1. **Introduction**

1.1 Many medical specialists are increasingly wishing to undertake ultrasound examinations on patients referred to them for their clinical opinion as a direct extension of their clinical examination. This may take place in the outpatient department, on the wards and in the assessment of emergency patients. Additionally there is a demand by some European Training Boards to incorporate ultrasound experience into clinical training and accreditation where appropriate.

1.2 This document makes recommendations for minimum ultrasound training requirements in the following areas:
- gynaecological ultrasound
- obstetric ultrasound
- gastroenterological ultrasound
- nephro-urological ultrasound
- breast ultrasound
- vascular ultrasound

2. **Aims and Principles**

2.1 The medical use of ultrasound remains highly operator dependent in spite of advances in technology and the interests of the patient are best served by the provision of an ultrasound service which offers the maximum clinical benefit and optimal use of resources i.e. with appropriately trained personnel using equipment of appropriate quality.

2.2 All who provide an ultrasound service are ethically and legally vulnerable if they have not been adequately trained. A defence against a claim for negligence is unlikely to be successful should an error of diagnosis be made by an untrained practitioner of ultrasound.

2.3 An appropriate level of training in ultrasound is one that allows for the provision of a safe and effective ultrasound service. This may be a purely diagnostic, predominantly interventional or a clinically focused service.

2.4 The European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB) has proposed minimal training requirements for the practice of medical ultrasound in Europe (Appendix 1). These identify three levels of training and expertise. The boundaries between the three levels are difficult to define precisely and should be regarded as a guide to different levels of competence and experience. In the detailed syllabuses appended an attempt is made to indicate more specifically the type of experience required for each level of training.

2.5 A system for recording the results of any ultrasound examination in the patients' record is mandatory. The permanent recording of images, where appropriate, is desi-

- Level 1
- Level 2
- Level 3

Certificate and training in CC

- Level 1
  - 5-10 examinations per week(under supervision)
  - Minimum no of examination 25 per system (vascular, thorax , abdomen)
  - Logbook kept
  - Supervised training by Level 2 competent person or level 1 with 2 years experience
  - Appropriate theoretical knowledge - course on fundamentals of ultrasound
  - Competency based training and assessment

Intensive Care Med (2008) 34:215–217
DOI 10.1007/s00134-007-0924-4

EDITORIAL

Paul E. Marik
Paul Mayo

Certification and training in critical care ultrasound

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P.E. Marik (✉)
Thomas Jefferson University, Division of Pulmonary and Critical Care Medicine,
834 Walnut Street, Suite 650, Philadelphia 19107, PA, USA
e-mail: paul.marik@jefferson.edu

P. Mayo
Beth Israel Medical Center, Division of Pulmonary and Critical Care Medicine,
New York NY, USA

Sir: We congratulate Vieillard-Baron and colleagues for their excellent article on echocardiography in the ICU featured in this edition of *Intensive Care Medicine* [1]. They present a strong and convincing argument in favor of using echocardiography as the primary modality for the initial and ongoing assessment of hemodynamic failure in the ICU. Backed by a comprehensive reference list, the article proposes that intensivists should be the care providers who perform, interpret, and apply echocardiography at the bedside of the critically ill patient. Cardiologists are not necessarily well equipped to fulfill this responsibility for several reasons; these include delay in performance of the study, the logistics in performing serial studies, inadequate knowledge of the complex clinical situation, and a mindset that is different from the intensivist in terms of the goals of the study. The article is of special interest to intensivists in North America, as it describes the European experience in developing a system of fellowship training for advanced critical care echocardiography that should be used as a model for their colleagues across the Atlantic. Advanced critical care echocardiography skill level would equate to level II competence as defined by the American College of Cardiology Statement on Competence [2]. The training program is an ongoing reality in Europe; several hundred intensivists have trained to advanced level. Of note, the training program for advanced skill level includes close cooperation with cardiologists in some parts of the training sequence. Our European colleagues demonstrate a remarkable level of cross-specialty cooperation and that should be a model for others to follow.

From the North American perspective, we have much to learn from our European colleagues. Critical care echocardiography has very little penetration into critical care practice in the USA. With few exceptions, fellowship training in this discipline does not exist. As a result, not many attending-level intensivists have skill in either basic or advanced echocardiography. Cardiology has traditionally controlled echocardiography, and may resist dissemination of the skills for complex political and economic reasons. For the simple reason that ultrasonography is so extraordinarily useful in critical care practice, training of fellows and attending physicians is becoming a reality in the USA and will inevitably become widespread. The European experience is of special interest to intensivists in North America, as it describes an excellent model that has clear application on this side of the Atlantic.

The American Society of Echocardiography/American College of Cardiology have developed training and competency guidelines in echocardiography [3]. These guidelines apply, in large part, to cardiology fellows requiring certification in echocardiography. Furthermore,

Certificate and training in CC

- Level 2
  - 1years experience at level 1 with a minimum of one session per week
  - Further 300 examinations
  - Logbook listing all all examinations
  - Illustrated logbook of 25 cases
  - Supervision of experienced level 2 or Level 3 practitioner
  - Accept referrals from Level 1 practitioners
- Level 3
  - A level 3 practitioner will spend the majority of their time undertaking ultrasound - expert
  - Accept referrals from level 1&2 practitioners
  - Spend a continuous period of specialty training in critical care ultrasound
  - Able to mentor and supervise Level 1&2 practitioners
  - Aware and pursue developments including Doppler and intravascular contrast agents

Как научить всех или хорошие перспективы для украинских анестезиологов

1. НМАПО им.Шупика – А.Н.Строкань

2. Медицинский университет им.Богомольца – Ю.Л.Кучин

Welcome to the US-Guided Anaesthesiology

Софилканич М.М.

Воротынцев С.И.

IX школа-семинар «Козацький спис»

«Регионарная анестезия в акушерстве и гинекологии»

Запорожье, 7-8 мая 2013 г.


Благодарим за внимание