POCKET RADIOLOGIST™

Interventional

Top 100 Procedures

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AMIRSYS™

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AMIRSYS™

W. B. SAUNDERS COMPANY
An Elsevier Science Company

AMIRSYS™

A medical reference publishing company

First Edition

First Printing: November 2002

Composition by Amirsys Inc, Salt Lake City, Utah

Printed in China

ISBN: 0-7216-0034-4

袖珍放射专家——干涉介入的100个主要诊断

[美]罗杰斯 著

Amirsys Inc 出版

上海世界图书出版公司 重印发行

2004年4月第1版

上海市尚文路185号B楼 邮政编码200010

各地新华书店经销(限中华人民共和国内发行)

图字：09-2004-034号

ISBN 7-5062-6530-3 /R · 60

定价：140.00元

Preface

The **PocketRadiologist™** series is an innovative, quick reference designed to deliver succinct, up-to-date information to practicing professionals "at the point of service." As close as your pocket, each title in the series is written by world-renowned authors. These experts have designated the "top 100" diagnoses or interventional procedures in every major body area, bulleted the most essential facts, and offered high-resolution imaging to illustrate each topic. Selected references are included for further review. Full color anatomic-pathologic computer graphics model many of the actual diseases.

Each **PocketRadiologist™** title follows an identical format. The same information is in the same place - every time - and takes you quickly from key facts to imaging findings, differential diagnosis, pathology, pathophysiology, and relevant clinical information. The interventional modules give you the essentials and "how-tos" of important procedures, including pre- and post-procedure checklists, common problems and complications.

PocketRadiologist™ titles are available in both print and hand-held PDA formats. Currently available modules feature Brain, Head and Neck, Orthopedic (Musculoskeletal) Imaging, Pediatrics, Spine, Chest, Cardiac, Vascular, Abdominal Imaging and Interventional Radiology. 2003 topics will include Obstetrics, Gynecologic Imaging, Breast, and much, much more. Enjoy!

Anne G Osborn MD
Editor-in-Chief, Amirsys Inc

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The diagnoses in this book are divided into 8 sections in the following order:

Venous
Dialysis
Arterial
Neuroangiography
Spine & Pain Management
Genitourinary
Chest
Abdomen

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Venous

Dialysis

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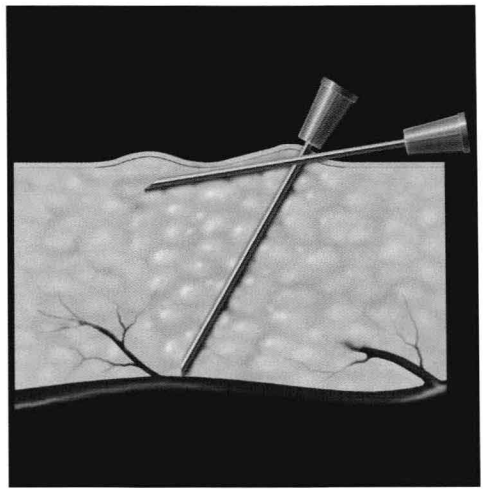
VENOUS

Local Anesthetics



Use of a long needle e.g. 1½ inches, allows same needle to be used for superficial and deeper administration of local anesthetic. Typically a 25, 27 or 30 gauge needle is used.

Key Facts

- Attention to detail in administration of local anesthetic (LA) provides improved pain prevention for patients
- Use 27 to 30-gauge (G) needles
- Inject LA slowly

Pre-Procedure

Indications

- LA is given for almost all interventional radiology (IR) procedures

Contraindications

- Allergy to LA agent

Getting Started

- Things to Check
  - History of allergies to a local anesthetic or other medication
  - Discuss pain prevention with patient
    - Inform patient that you will try to minimize their discomfort
    - Inform patient to notify you when in pain so it may be treated
- Equipment List
  - 1½ inch, 25 to 30 G needle
  - Lidocaine 1% or 2% in plastic container with a rubber stopper
    - Procedure kits often come with lidocaine in a glass ampule because this method of storage provides longer shelf life
    - Downside of glass is need to use filter needle and may cut yourself
  - Local anesthetic should be in a control syringe or at least a different color or size or labeled syringe so that distinct from other syringes
    - Control syringes have finger holes which facilitate one-handed withdrawal of plunger for confirming not intravascular

1% lidocaine is used when a relatively large subcutaneous area is infiltrated such as for a chest port. 2% lidocaine is helpful when a relatively small area is infiltrated such as for a biopsy or a pain management spinal injection procedure.

Procedure

Patient Position

- Usually prone or supine with procedure area surrounded by sterile drape

Procedure Steps

- Draw up LA with a short length, 18 G needle
  - Short length, large bore needles allow LA to be drawn up rapidly
  - Inject a few cc of air into plastic container of LA to speed up withdrawal
  - However, do not inject air into glass medication vials as these lack compliance and medication will leak around needle
  - Note number of cc in syringe as will be guide to how much injected
- Connect syringe with 25 to 30 G needle
  - Procedure kits often include short, 25 G needles with light blue hub
  - Preferable to use 1½ inch long, 27 to 30 G needles as these hurt less
  - Added length of 1½ inch needle allows subcutaneous (SQ) and deeper infiltration with same needle
- If plan to also provide intravenous sedation, then give IV medications first
  - Will provide some analgesia before LA needle placed

1% Versus 2% Lidocaine

- In general, if only a small area needs LA use 2% lidocaine
- If need infiltrate more extensive area, such as for chest port placement, 1% lidocaine is preferable to provide more volume

Needle Placement

- Can gently pinch skin with fingers where will insert local anesthetic needle
  - Large, myelinated touch fibers send input to dorsal horn that helps obscure signal from smaller, unmyelinated pain fibers
  - This is consistent with gating theory of pain
- Place LA needle into skin 1 cm away from where will actually puncture or cut for procedure
  - Allows controlled delivery of deep and SQ LA

  - Do not put LA needle straight down at puncture site because as withdraw to make SQ wheal may "backspray" yourself with LA
- Make a good skin wheal as majority of pain receptors located here
- If need to stick needle through skin more than once, go through an area already anesthetized for subsequent needle sticks
- Also inject LA along the planned tract for procedure, including periosteal area when appropriate, because it is innervated
  - Can use a long, small diameter needle to inject tract
- Important to inject LA very slowly, because rapid injection is painful
- Because LA preferentially blocks small pain fibers, and not larger pressure sensitive fibers, patient will feel pressure during procedure
- "Preemptive analgesia" refers to providing analgesia before procedure starts with goal of preventing pain rather than just treating as it occurs
- Anxiety increases pain and can be decreased by talking in a calm manner
- Intravenous benzodiazepines such as midazolam also decrease anxiety
- Give LA some time to work
  - A good method is to give LA, and then spend a moment setting up equipment table
  - Lidocaine skin infiltration usually has taken it's effect within one minute

Additional Options

- Pain of local anesthetic is part due to storage with a weak acid
  - Can counter by add 1 cc sodium bicarbonate 8.4% per 10 cc lidocaine
- Warming local anesthetic to body temperature can also decrease pain
- Lidocaine wears off in 0.5 to 3 hours, so give additional with long cases

Lidocaine Dosing

- 1% lidocaine contains 10 mg/cc and 2% lidocaine contains 20 mg/cc
- Maximum dose for lidocaine is 4 mg per kg
- Therefore, in a 70 Kg adult (4 mg/kg)(70 kg) = 280 mg is maximum dose
  - This is 28 cc of 1% lidocaine in a 70 kg adult
- Also remember that LA is absorbed into the vascular system very rapidly in some sites such as intrapleural and intercostal

Lidocaine is Bacteriostatic

- Lidocaine is bacteriostatic and acidic and thus should not be injected into fluid collection, e.g. pleural fluid, that is to be sent for laboratory analysis

Post-Procedure

- Observe patient for signs of LA toxicity

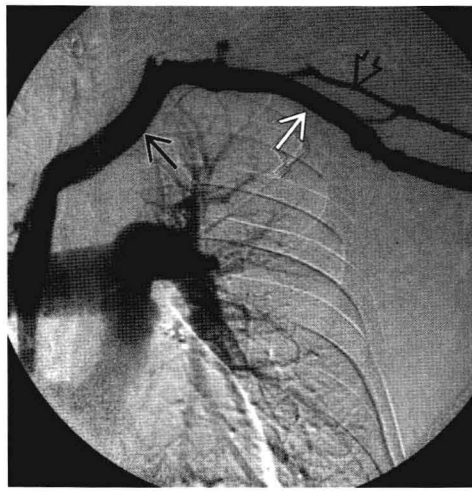
Common Problems & Complications

- Allergic reactions and side effects of LA infiltration for IR are very rare
- Early symptoms of LA toxicity include numbness of tongue, "metallic taste", lightheadedness and dizziness
- These as well as blurred vision and tinnitus can serve as a warning that patient at risk for seizure, respiratory arrest and coma
- Ask patient about symptoms when give relatively large amounts of LA to help identify a potential problem early, and begin treatment with oxygen

Selected References

1. Colaric KB et al: Pain reduction in lidocaine administration through buffering and warming. Am J Emer Med 16:353-6, 1998
2. Fialkov JA et al: Warmed local anesthetic reduces pain of infiltration. Annals of Plastic Surgery 36(1):11-13, 1996
3. Tetzlaff JE: Clinical effects of LA pH adjustments: Review. Anesthesiology Review 20(1):9-15, 1993

Arm Venogram



Normal left arm venogram. It shows brachiocephalic vein (black arrow), axillary vein (white arrow) and cephalic vein (open arrow). Note: Normal cephalic vein resembles a hockey stick. Main pulmonary arteries are also opacified.

Key Facts

- Main goal is usually to display venous anatomy of antecubital region and subclavian-brachiocephalic vein junction
- Spot films and tourniquets are used for venogram of arm
- Digital subtraction angiography (DSA) is used for venogram of subclavian and brachiocephalic veins and superior vena cava (SVC)

Pre-Procedure

Indications

- Vein mapping for dialysis graft, cardiac or peripheral vascular surgery
- Nondiagnostic or equivocal ultrasound: For example, to differentiate acute versus chronic deep vein thrombosis (DVT)
- Ultrasound unable to be done due to surgical dressing or painful wound
- Venogram can be requested for more detailed evaluation of subclavian and brachiocephalic veins than provided by ultrasound

Contraindications

- Severe contrast allergy is a relative contraindication
  - Procedure may be done following a steroid and Benadryl prep and with use of nonionic contrast
- Moderate renal failure is a relative contraindication
  - If procedure needs to be done, patient should be hydrated prior to procedure

Getting Started

- Things to Check
  - If antecubital puncture likely to be necessary then check if patient is taking Coumadin
  - If taking Coumadin, check INR
  - Check renal function
  - Performance of this procedure requires at least 2 medical persons, so make sure you have an assistant