The Neuraxiom Playbook of Essential Nerve Blocks

A Handbook of Ultrasound Guided Regional Nerve Blocks

The Second Edition

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I would like to thank my friends, the anesthesiologists of Olympia Anesthesia Associates, for their unfailing support in helping me collect and create the techniques and content for this work. Thanks also to those members of the same group who were patient enough to proofread and edit my endless ramblings into a much more readable set of ramblings.

THE DISCLAIMER

Every good medical technique guide starts with "the disclaimer" and here is my version of this indispensable component. It's not that I don't want you to take the contents of this book seriously or that I think the ideas presented here aren't valuable and safe. But because what we are considering here is nothing less than working on real people I have to make sure you are using all of your best training, judgment, and technique along with the advice covered here.

I'm not there with you so I'm not in a position to grab your hand at the fateful moment, or throw myself between you and the ultrasound screen to remedy some procedural error that can result in unhappiness, so I'm going to craft this disclaimer carefully to point out that when it comes to sticking a needle into some other person you're the expert, not me.

I have tried to be accurate in my descriptions, my drawings, my procedures, my diagrams, and my advice, but this is a book, and I'm not standing next to you so I don't see what you see. Think of the contents of this book as the advice I would give you if I were standing next to you. The advice either should or shouldn't be taken into consideration, based on your evaluation of its worth in a given situation.

Nothing I say or imply in this book should supersede the clinical judgment and acumen of the practitioner standing beside the patient – You.

The Neuraxiom Playbook is intended for use by medical professionals, specifically those who perform invasive regional anesthetic procedures. If you're reading this and don't know what I mean, you've bought the wrong book and you should return it to where you bought it for a full refund.

By now you should be aware that not everything you hear and read is true, real or appropriate to real life. So the following disclaimer is there for the obvious reasons. The short form is: *IF IT DOESN'T MAKE SENSE OR SEEM RIGHT TO YOU, DON'T DO IT*. Having said all of this I hope the information found in this book is helpful to you in making decisions regarding your practice. Most of the techniques described here are either new and non-invasive (like ultrasound surveys) or invasive things you already do (like sticking needles into people).

So –

Neuraxiom LLC, myself and those people associated with it make no warranties as to the correctness, safety or appropriateness of any therapies, medications, dosages, techniques or any other aspects of medical practice or patient care and safety. Nothing in this book should be interpreted to imply that anything but YOUR BEST MEDICAL JUDGMENT is appropriate for making safe medical decisions and implementing therapies for your patients.

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CHAPTER 1

INTRODUCTION

Let's Get This Started

Chapter 1 THE INTRODUCTION

You can't have a book without an introduction, so here goes. Why Neuraxiom? The name was supposed to be a combination of the root "neur" for nerve and "axiom" meaning "self-evident truth" because it favors the empirical product. It's kind of a coincidence that it sounds like "neuraxial", which happens to point in the opposite direction from the peripheral nerves, and even more unintended it sounds like "Neuraxis", which is also a heavy metal band.

As I said, the appeal to me is the second part, "axiom". A "self-evident truth". This defines my approach to the field of ultrasound guided peripheral nerve blocks. This approach is based primarily on practical, useful, commonly-observed causes and effects of safely creating peripheral nerve blocks.

So, for the purposes of working out techniques for blocks, I have relied on what I have observed. This means that if you are looking for a lot of footnotes and bibliography in this work, you're going to be somewhat disappointed. I do review references and literature, but I try to combine the information from these sources in ways that simplify the concepts and structures that are necessary components for the block.

Above all, I believe that the "Ultrasound Guidance" portion of the techniques we will cover is a beautifully pure form of applied anatomy, made even more exciting because the application advances the very worthwhile goals of relieving others of their pain.

I have tried to approach these techniques without pre-conceived notions about the way things are supposed to work and to look instead for experiences to inform me as to what to expect.

For instance, if you look in a book detailing the common characteristics of the different local anesthetics, you will find tables showing that bupivacaine has an onset time of 30 to 40 minutes. I don't know what to make of that because I've seen bupivacaine blocks that have taken hours to complete. One example of this involved a young man who had an interscalene brachial plexus block for shoulder repair. He had good coverage of the shoulder from the block. He could move his fingers and grip his affected hand immediately after the block, and following the surgery, which took a little over an hour. Later, after leaving the recovery room and before discharge, his hand and fingers became involved in the block as well. (The block wore off in reverse order later the following day.)

I also know that the duration of effects from different local anesthetics are widely variable and have as much to do with the size of the nerve as the concentration and volume of the drug. For example, 30 mls of Bupivacaine 0.5% injected around the brachial plexus nerves may produce a block lasting anywhere from 16 – 28 hours, but the same 30 mls around the sub-gluteal sciatic nerve can produce a block lasting 48 – 72 hours.

I am always looking for a simple model for the actions of local anesthetics that fits all of the observations. I believe this may lead to an alternate working model of what can go wrong with nerve blocks and what can cause symptoms of nerve injury following otherwise unremarkable nerve blocks. If some of what I write seems "out of step" or unconventional or even (hopefully) overly simplistic, please humor me and my approach and read on.

My goal is to present simple, safe, and effective procedures for performing a few of the most useful regional nerve blocks in a manner that is easy to understand, applicable to the greatest range of situations in patients, and successful in the greatest percentage of attempts.

I have been asked whether it's appropriate that I advocate block methods to anesthetists. You may know by now I am not an anesthesiologist. For many years, I have assisted anesthesiologists with their regional blocks. I've met many fine and generally skillful anesthesiologists who could handle almost any situation they found themselves in. I also noticed many of them have blind spots in their practice when it came to regional nerve blocks. It seemed to me, like many other skills, they had learned one way to perform a block, sometimes many years earlier, and by default they clung to that method, whether successful or not.

The turning point in my thinking came one day years ago, when one of the senior anesthesiologists I worked with – I'll call him Dr. "A", a wonderful man and physician, who had been practicing anesthesia for over 30 years -- spoke to me privately asking if I had seen a better way of doing an axillary brachial plexus block. Dr. "A" told me, for his entire career, he had been performing axillary blocks and he had never been satisfied with the method. Some of his blocks worked and some of his blocks didn't, and he didn't know why. I had the feeling from our conversation that he had almost come to dread those occasions when it was necessary for him to perform an axillary brachial plexus block. I told him about the method I had seen used by one of his colleagues (Dr. "B") that seemed to work the majority of the time. From that time on, Dr. "A" used the Dr. "B" method for his axillary blocks (Are you still following me?) with successful results.

A few years later, when our department purchased our first ultrasound machine, we primarily used it for central venous access, but I began experimenting with it to identify nerves. After I had successfully mapped out the location of the nerves of the brachial plexus in the axilla, I approached Dr "B", whose method for axillary block I had related to Dr. "A" (now retired). I explained my methods for ultrasound guidance of the needle to the nerves for the axillary block to Dr. "B" and asked him if he would be interested in

trying it out. I remind you here that this is the very anesthesiologist whose method I considered the most successful and easily explainable to someone who needed help. Upon hearing my proposal this fellow was immediately eager to try it, and after a few times of using ultrasound guidance for placing the needle next to the nerves he dropped his previous method (which was the trans-arterial method) and never used it again.

While this was something of a success story for me, it was a greater success story for Dr. "B" because he had just acquired a method that made more sense to him and had more consistent results. It took the guesswork out of the block.

I also work with anesthesiologists who just seem to possess the perfect touch for nerve blocks. Unerringly, they find the brachial plexus in the interscalene space or the axillary space with nerve stimulators. They seem to have x-ray vision when it comes to performing a femoral or sciatic block with stimulators. Even though they did not need to necessarily embrace the ultrasound technology, most of them did. I cannot explain how these gifted individuals could find their target nerves with as few needle passes as it usually took, but I can explain how to find those targets with as few or fewer passes with ultrasound, and therein lies the difference. Ultrasound technology levels the playing field for all of those people who don't have a preternatural knack for nerve blocks. Ultrasound guidance can place those high success rates and, I believe, lower complication rates in your hands.

Regional nerve blocks are part of every anesthetist's practice. Almost everyone who gives anesthesia is expected to be able to perform regional nerve blocks, in some cases as the anesthetic and in other cases for postoperative analgesia. Whether they have the skills, whether they have some sort of natural talent, anesthetists will be sticking needles into patients, sometimes over and over. My motivation is to keep the number of needle passes to a minimum, keep the level of safety at a maximum, and to bring the success rate to as near perfect as possible. Creating methods for safe and effective blocks benefits everyone, most importantly the patient.

SURVEY SAYS ...

I use the word, "**Survey**", frequently in this work, sometimes as a noun and sometimes as a verb. Probably too much. The noun form means the *ultrasound image* you create using the probe, the gel, and the rest of the gear. The verb "Survey" means the *technique* or *plan* you are using to find the target.

WHERE REAL LIFE CONFLICTS WITH TECHNICAL WRITING.

Many of you know that before writing this I had created a website, http://neuraxiom.com. Working with this website taught me a great deal about long distance teaching and even more about how I wanted to do it. Let me explain that if you want to make a website that is useful and understandable, and it involves ultrasound images, at some point you have to decide which pictures to put on the site. This is a common problem with anyone making a site with ultrasound images.

There are basically 3 kinds of images that you have to choose from when you're creating a chapter on ultrasound image interpretation. The first kind is crisp and clear, with plenty of detail, showing layers, boundaries and all the anatomical structures toward which you intend to direct the visitors' attention. The second type of image could be called equivocal, it shows less distinct definition of boundaries in layers and the anatomical structures are not as well defined. The third type of image seen on ultrasound survey could be called "not ideal", crummy, or even featureless. All three of these types are very common when you are performing ultrasound surveys. But guess which type is the most common to both our website or in books about ultrasound surveys? That's right, type 1 the perfect image. This is necessary so the reader or visitor can see what you are talking about. The nice pictures allow you to place arrows, circles, and notes that aid in meaningful interpretation of the picture. It's unfortunate that these pictures can lead the visitor or reader to believe that this is the type of image that they should expect to see on every ultrasound survey performed. And when they don't see the characteristic image they feel like there's something wrong with them, their equipment, or their technique. This is not the case. As we

discuss later under Chapter 2, “Ultrasound, The Real Story”, you can see good detail on most people, but on some people, inexplicably (at least to me, right now), the ultrasound survey is foggy and lacks definition. This does not seem to be related to body habitus, age, or general condition. I think it may relate to hydration. I'll get back to you when I figure it out.

The techniques we will talk about here are meant to be used with almost any quality ultrasound image. Unless your practice is limited to performers from Cirque du Soleil, I don't expect your patients to provide you with picture-perfect images to help guide your needle. Therefore, there will be tips along the way for dealing with less than perfect images. This is, after all, real-life.